

Messrs.

Confidential

(first • revised)

Delivery SpecificationsProduct No. : Quartz Crystal Unit SC-20SItem code : Q-SC20S03220C5AAAFProduct form : 32.768kHz $\pm 20 \times 10^{-6}$ / 12.5pFThe number of copies : 1copyData of registration :

| Receipt Column | Note |
|----------------|------|
| | |

〈NOTICE〉

1. Advance agreement will be needed before changing any contents of the specification herein.
2. Provided that the information herein is subject to change, only revised pages shall be reissued.
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Dept. of Issue
Sales Section

Dept. of Control
Quality Assurance Section

Delivery Specifications

1. Scope

These specifications apply to QUARTZ CRYSTAL RESONATORS (hereinafter referred to as RESONATORS) to be manufactured by Seiko Instruments Inc. (hereinafter referred to as SII) to _____

2. Designation

RESONATORS are designated "SC-20S" (32.768 kHz).

3. Shape and dimensions

As per the SC-20S drawing shown on page 5 .

4. Electrical characteristics

Specified on page 2 through 3 .

5. Shipment and packaging

5.1 (3,000) pcs are the standard lot size to which the lot number shall be allotted

5.2 The packaging shall conform to the resonator packaging standards.

6. Outgoing inspection

6.1 When mutually agreed, the outgoing inspection shall be conducted as per the standard on page 4.

6.2 The outgoing inspection slip is not basically affixed to each packaging.

7. Warranty

In the event that any defective RESONATORS or defective lot is found at incoming inspection at _____ and that any defect resulting from failures in process-control at SII after incoming inspection is found, good RESONATORS shall be supplied to _____ free of charge as a replacement.

In the event that any trouble or problems rising directly from RESONATORS occurs, it will be amicably settled between both parties, provided that warranty shall be done within the score of replacement of good RESONATORS.

8. Amendment or abolition of the specifications

Amendment or abolition of the specifications shall be made upon mutual consent between _____ and SII. If any problem arises, it shall be amicably settled between both parties.

9. Effectiveness of the specifications

These specifications are effective after receipt of returned copies with your approved sign.

10. Others

This product is completely Pb-free and Halogen-free.

[1] The maximum rating

| | Item | Symbol | Rating | Note |
|---|---------------------------|---------|------------------|------|
| 1 | Storage temperature range | T_stg | -55 ~ +125 | |
| 2 | Maximum drive level | DL max. | 0.5 μ W max. | |

[2] Recommended Operating Condition

| | Item | Symbol | Rating | Note |
|---|-----------------------------|--------|------------------|------|
| 1 | Operating temperature range | T_use | -40 ~ +85 | |
| 2 | Drive level | DL | 0.1 μ W typ. | |

[3] Electrical-CharacteristicsMeasurement temperature :25 \pm 2

| | Item | Symbol | Specifications | Conditions |
|----|-----------------------|----------------|--------------------------------------|--|
| 1 | Nominal frequency | f_nom | 32.768 kHz | |
| 2 | Frequency tolerance | f_tol | $\pm 20 \times 10^{-6}$ | |
| 3 | Load capacitance | C _L | 12.5 pF | |
| 4 | Motional resistance | R ₁ | 90 k max. | Measured with ATI 4192A Impedance analyzer OSC LEVEL = 0.1V |
| 5 | Motional capacitance | C ₁ | 6 fF typ. | |
| 6 | Shunt capacitance | C ₀ | 1.3 pF typ. | Measured with ATI 4192A Impedance analyzer OSC LEVEL = 0.1V |
| 7 | Turnover temperature | Ti | 25 \pm 5 | Measure this coefficient at 3 points of 10 , 25 , 40 using C-MOS circuit |
| 8 | Parabolic coefficient | B | $(-3 \pm 1) \times 10^{-8} / ^2$ | |
| 9 | Frequency aging | f_age | $\pm 3 \times 10^{-6} / \text{year}$ | 25 \pm 3 , First year |
| 10 | Insulation resistance | IR | 500 M min. | Measured with ATI 4329A Insulation Resistance Meter Apply DC100V |

[4] Environment and Mechanical characteristics

| | Item | Specifications | Conditions | |
|----|--|---------------------------------|---|----------|
| 1 | High temperature storage 1 | $f/f_0 = \pm 10 \times 10^{-6}$ | After storage under 85 for 1000 hours, measure at room temperature. | *1 *3 |
| | High temperature storage 2 | $f/f_0 = \pm 15 \times 10^{-6}$ | After storage under 125 for 1000 hours, measure at room temperature. | *1 *3 |
| 2 | Low temperature storage | $f/f_0 = \pm 10 \times 10^{-6}$ | After storage under -55 for 1000 hours, measure at room temperature. | *1 *3 |
| 3 | High temperature and high humidity storage | $f/f_0 = \pm 10 \times 10^{-6}$ | After storage under $+85 \pm 2$, 85 % RH for 1000h, measure at room temperature. | *1 *3 |
| 4 | Thermal shock resistance | $f/f_0 = \pm 10 \times 10^{-6}$ | Measure at room temperature after 100 cycles. -55 +125 for 30 minutes. | *1 *3 |
| 5 | Mechanical shock resistance | $f/f_0 = \pm 10 \times 10^{-6}$ | Measure after 100g-dummy(SII Standard) drop from 1500mm height on the concrete 3directions 10times. | *2 |
| 6 | Vibration resistance | $f/f_0 = \pm 10 \times 10^{-6}$ | Amplitude 1.5mm and 10 ~ 500Hz with cycle time 15 minutes in 3 direction (X,Y,and Z axis) each for 2 h. | *2 |
| 7 | IR Reflow | $f/f_0 = \pm 10 \times 10^{-6}$ | Measure after 2 time reflow under reflow profile specified in page 10 | *1 |
| 8 | Shear strength | No peeling-off | Pressuring force $10N \times 10 \pm 1sec.$ according to IEC60068-2-21 | *2 |
| 9 | Peel strength | No peeling-off | Pressuring force $10N \times 10 \pm 1sec.$ according to IEC60068-2-21 | *2 |
| 10 | Bending test | No peeling-off | Bending: $3mm \times 5 \pm 1sec.$ Thickness of the testing board: 1mm | *2 |

Note:

1. Each test shall be done independently. (not in series tests)
2. *1: Measure after 24 hours left at room temperature.
3. *2: Measure after 2 hours left at room temperature.
4. *3: Pre conditions
 - (1) IR Reflow : 2 times
 - (2) Initial values shall be measured after 24 hours at room temperature.
5. Shift in series resistance after the above tests shall be less than $\pm 20\%$ or less than $\pm 15k$.
In case of resistance to IR reflow, shift in series resistance after the above tests shall be less than $\pm 30\%$ or $\pm 20k$.
In case of resistance to high temperature storage(± 125 for 1000 hours), shift in series resistance after the above tests shall be less than $\pm 40\%$ or $\pm 30k$.

[5] Precautions

(1) Recommended mounting conditions

Reflow profile As per reflow profile shown in page 10.
 Manual soldering 350 max. for 4 sec. Max.

(2) Cleaning

The crystal resonator may be destroyed by ultrasonic cleaning.
 We don't guarantee the quality of the product with that cleaning method because such conditions as type of the washing machine, power, time, position in the bath, etc. can not be specified.

Please confirm ultrasonic cleaning is not giving any damage to the product before use when that cleaning method must be used.

[6] Outgoing inspection standard

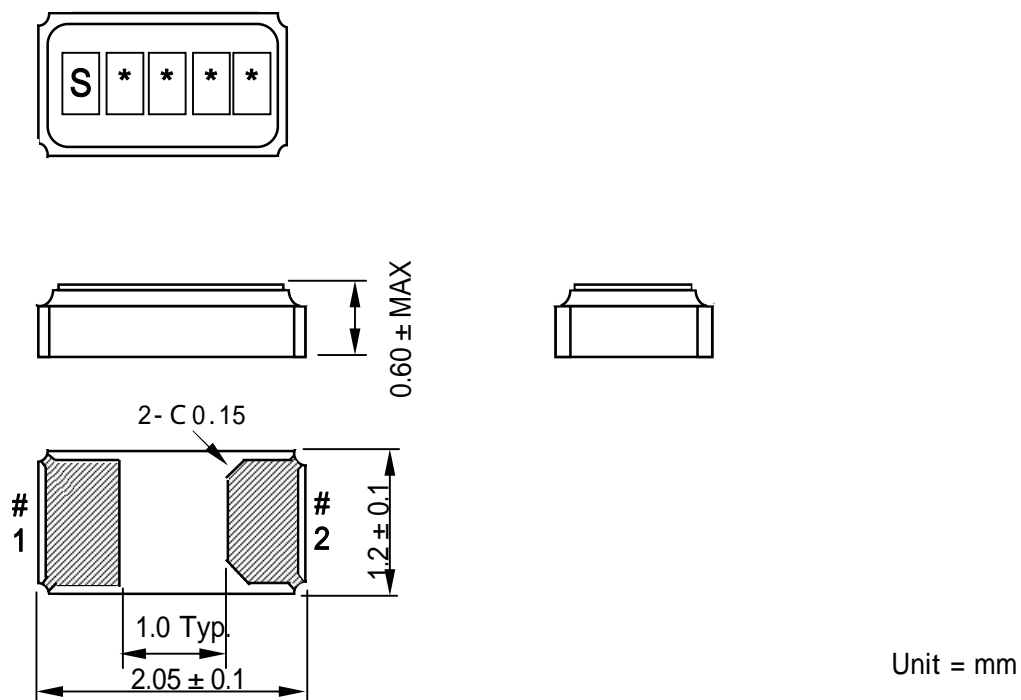
· The outgoing inspection shall be conducted as per the following standard.

· The sampling shall be performed according to the ANSI/ASQC Z1.4-1996.

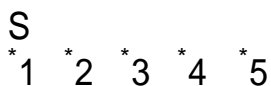
| NO | Item | Sampling level | AQL(%) |
|----|------------------------------|-------------------------------|--------|
| 1 | Frequency tolerance | | 1.0 |
| 2 | Equivalent series resistance | | 1.0 |
| 3 | Outer appearance | | 1.5 |
| 4 | Others characteristics | Periodical quality inspection | |

[7] Dimensions and marking layout

1. Out Line Drawing

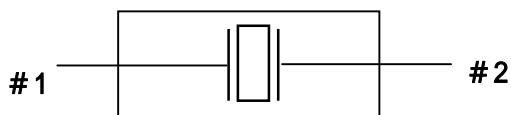


2. Marking

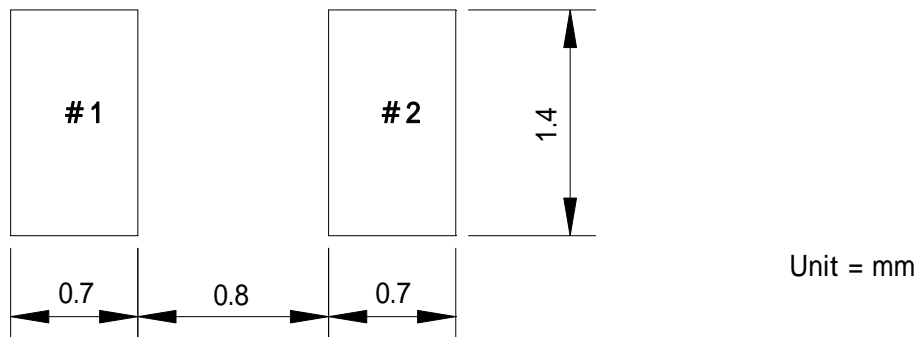


- *1 Specification
- *2 CL (7pF : B, 9pF : J, 12.5pF : F)
- *3 Year of Production(Last digit of year)
- *4,5 Week of Production(01 ~ 52)

3. Lead Connection



4. Recommended PAD lay-out



Materials :

- Case: Alumina ceramics, Ni-plated, Au-plated
- Lead : Kovar material, Ni-plated

[8] Taping specification

1 . Drawing of tape dimensions

Carrier tape : Refer to page 8.
Taping reel : Refer to page 9.

2 . Material

Carrier tape : PC black conductive
Taping reel : PS conductive

3 . Taping method

- (1) Taping shall be placed in tapes in such manner as to assure that marking of the components is visible as per Fig.1

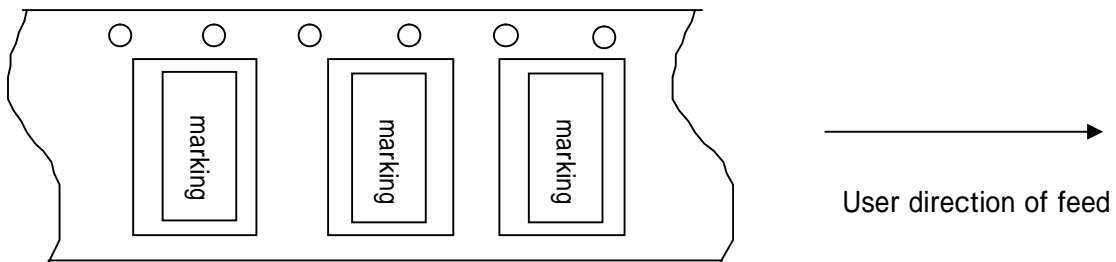


Fig. 1

(2) Reel

On the side of reel there shall be more than 40 blocks of "No components".
The beginning of Carrier Tape shall be bent vertically and hooked on groove of reel.

(3) Leader

On the side of leader, there shall be more than 40 blocks of "No components".
The length of Leader shall be over 400 mm.
The Length of Stick Tape for Cover Tape shall be about 100 mm and
Stick Tape shall never be detached.

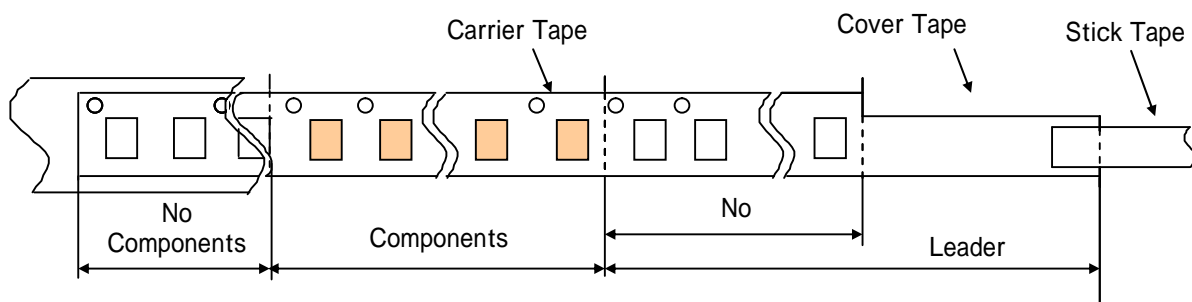
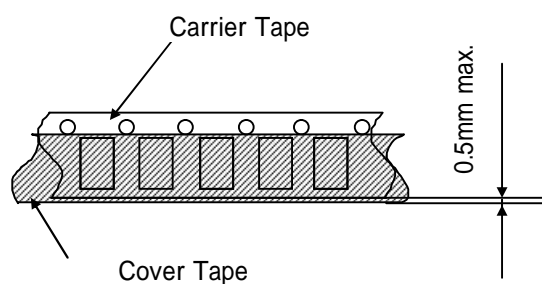


Fig. 2

User direction of feed

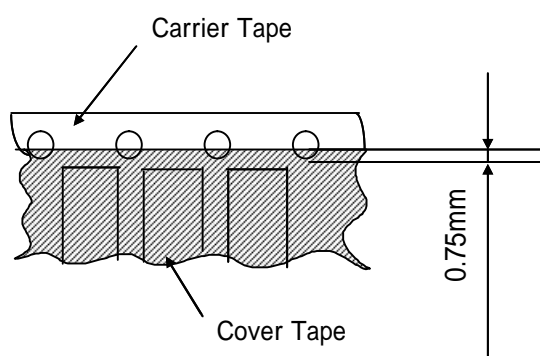
- (4) Gap between Carrier Tape and Cover Tape
Cover Tape protrudes from Carrier Tape by 0.5mm max.

Fig. 3



Holes of Carrier Tape are covered with Cover Tape by 0.75mm max.

Fig. 4



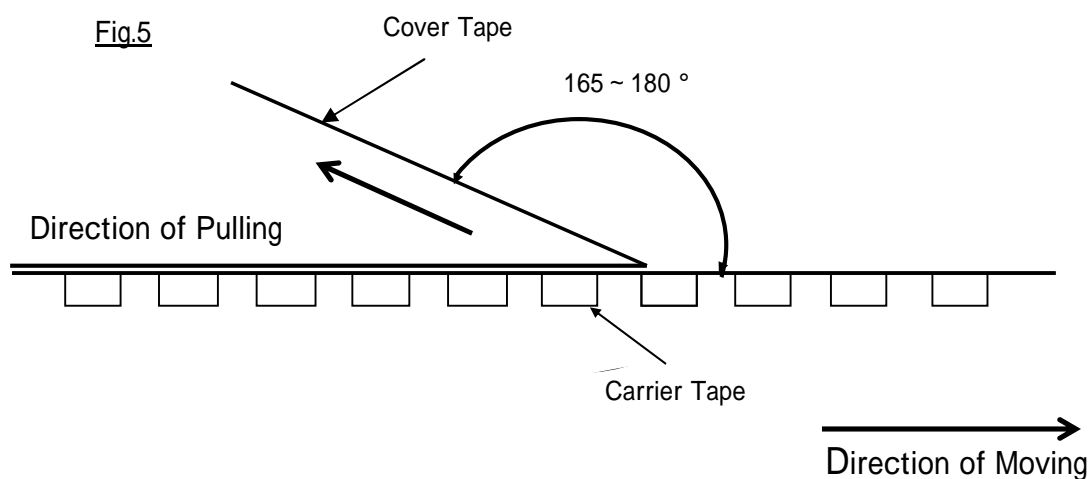
- (5) Peel strength

The method of testing is done as shown below.

The value of force is at the beginning of desealing.

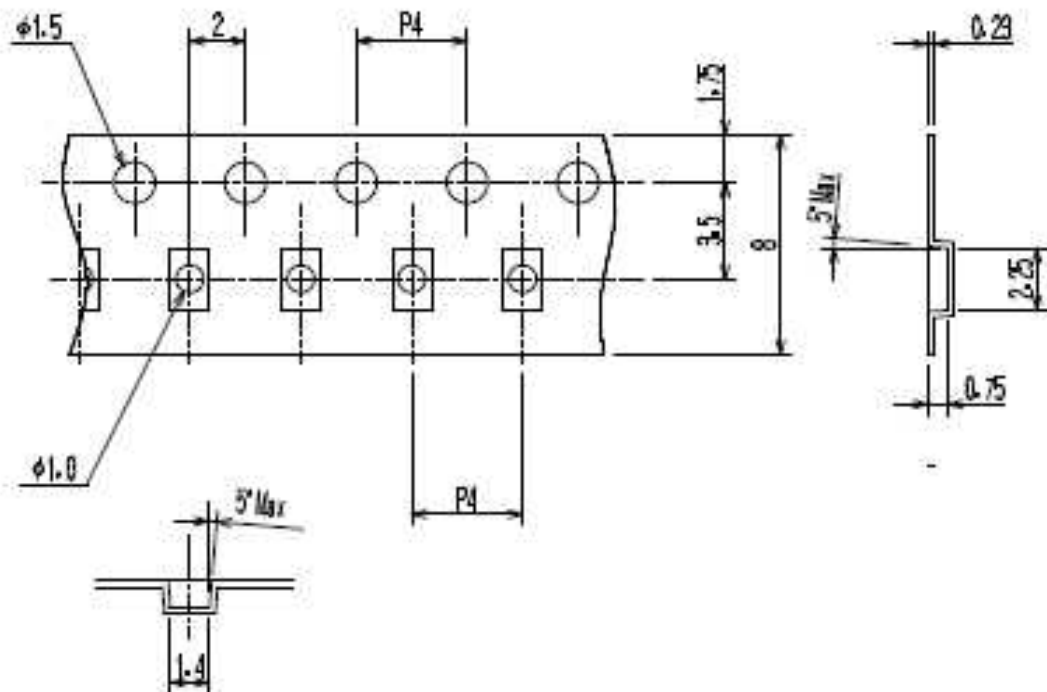
The Cover Tape peel forth shall be 0.1 ~ 1.3N at a peel speed of 300 ± 10 mm/min.

Fig.5



Carrier tape

- (1) Conforms with EIA-481
- (2) Tolerance : ± 0.2

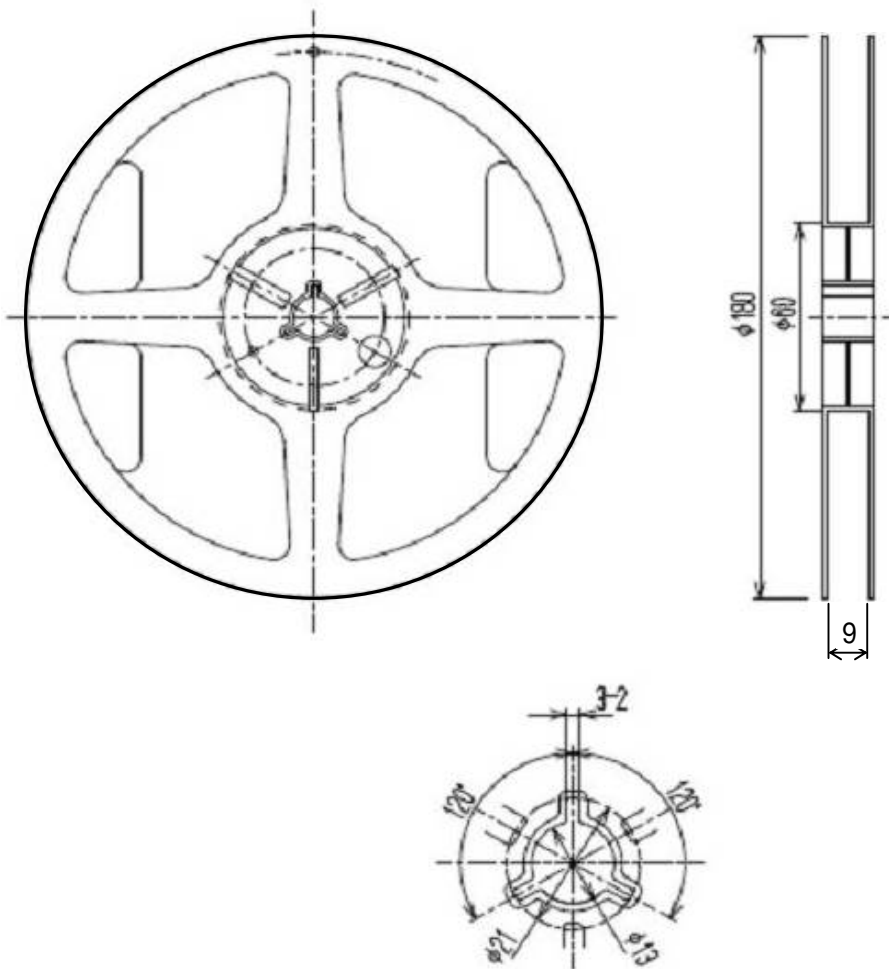


Unit=mm

Taping reel

(1) Conforms with EIAJ ET-7200B

(2) Quantity per reel : 3,000pcs./for a reel



Tolerance: ± 0.2 mm

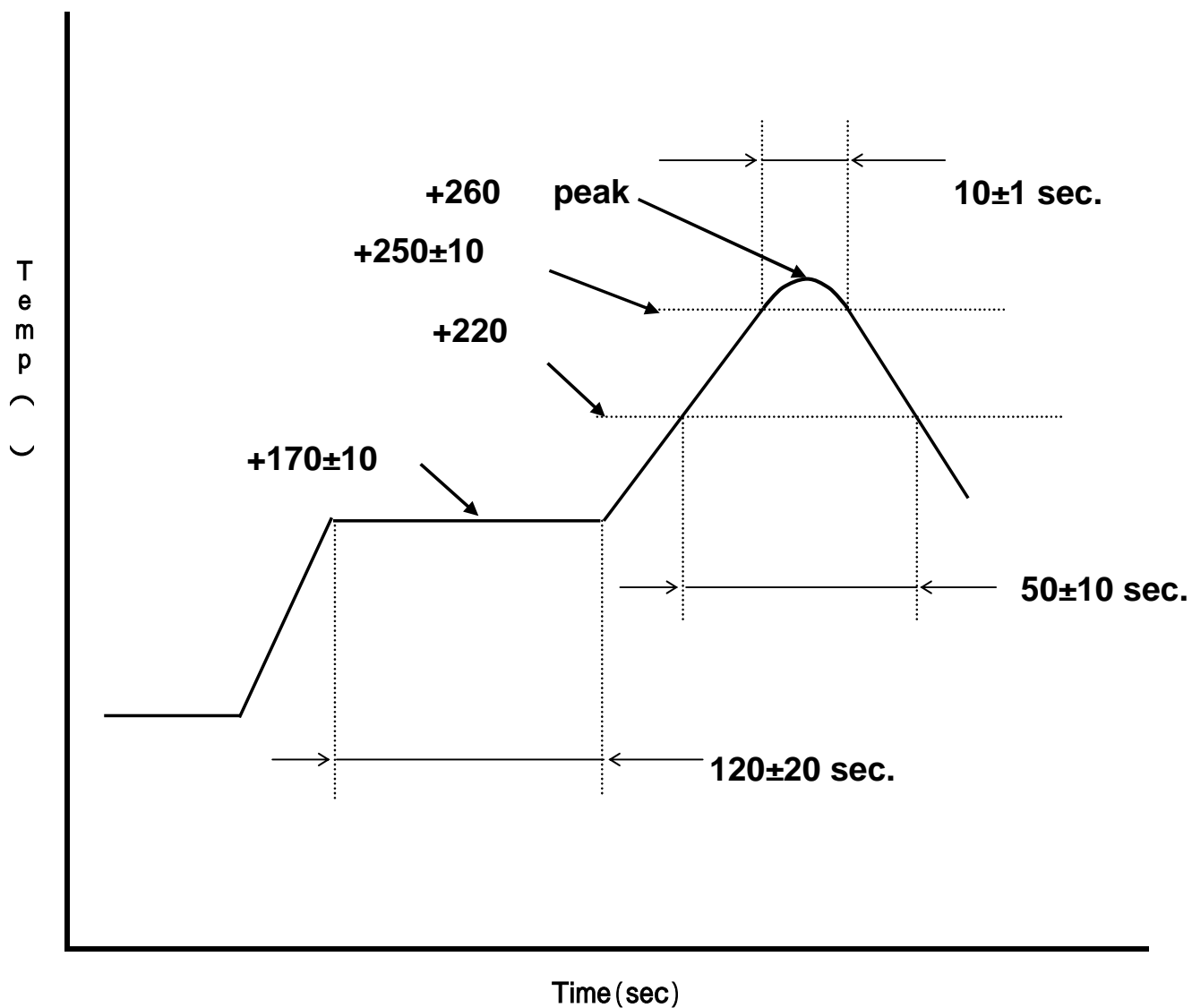
| Item | Specification | Unit |
|----------------------|--------------------|------|
| Materials | PS(anti statics) | - |
| inside reel wise W1 | $9.0 \pm 1.0 / -0$ | mm |
| outside reel wise W2 | 11.4 ± 1.0 | mm |

Unit = mm

[9] Reflow Profile

Pre-Heating temperature: +170
 Heating temperature : +220

Pre-Heating time: 120sec
 Heating time : 50sec

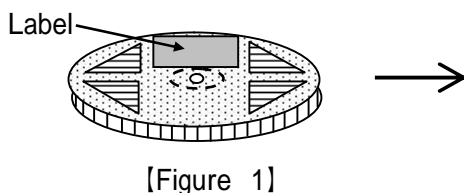


Note:

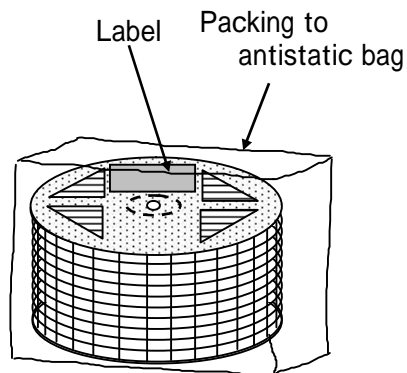
- (1) The temperature used herein means the temperature on the circuit board.
- (2) Reflow is permitted 2 times.

[10] Outside box packing specification

- 1) The label is attached on each reel.
- 2) 10 reels are put into each antistatic polyethylene bag.

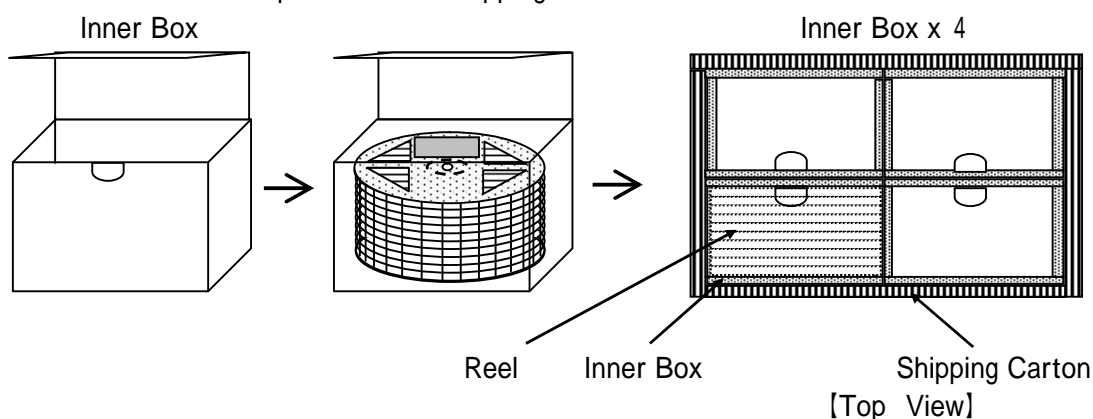


[Figure 1]



[Figure 2]

- 3) **Packing**
 - 10 reels are put into each inner box.
 - 4 inner boxes are put into each shipping carton.



- 4) **Storage quantity**
 - It makes N = 3,000 pcs/Lot

5) Sample of the label display (Please refer to [Figure 1] [Figure 2])

| | | | |
|--|----------|--|-------------------------------------|
| Product bar code | Part | SC-20S | : Our company product name |
| | Lot No. | 000001 | : Lot No. |
| Item bar code * | Quantity | 3,000 pcs | : Quantity |
| | Spec. | 32.768kHz 12.5pF/ $\pm 20 \times 10^{-6}$ | : Frequency, CL value, F0 deviation |
| Quantity Lot.No.bar code 3,000 XXXX | Remarks | RoHS Compliant Pb Free | :Remarks |

- 6) **Storage environment**
 - Please keep the product under the following condition
 - * No direct rays
 - * Temperature condition : 5 ~ 30
 - * Humidity condition : below 80%