

Messrs.

DRAFT

(first revised)

Delivery Specifications**Confidential**

Product No : Quartz Crystal Unit SP-T2A-F

Item code : Q-SPT2P0327620C5DJ

Product form : 32.768kHz ± 20 × 10⁻⁶ / 12.5 pF

The number of copies : 1 copy

Date of Registration : November 2, 2020

Receipt	Remark

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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.
3. When the product described herein includes Regulated Products subject The Wassenaar Arrangement etc., they may not be exported without authorization from the appropriate governmental authorities.
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5. In the case that the products described herein are used as part of any devices or equipment which might influence any one of the human body, human life and property, such as physical exercise equipment, medical equipment or vehicles, please let us know that.

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Approved by QA

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 customer.

2. Designation

RESONATORS are designated "SP-T2A-F" (32.768 kHz).

3. Shape and dimensions

As per the SC-12 drawing shown on page 5.

4. Electrical characteristics

Specified on page 2 through 3.

5. Shipment and packing

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

5.2 The packing shall conform to the resonator packing 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 packing.

7. Warranty

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

In the event that any trouble or problems rising directly from RESONATORS occurs, it will be amicably settled between both parties.

However, the scope of warranty shall be the replacement of good RESONATORS.

8. Revision or abolition of the specifications

Revision or abolition of the specifications shall be made upon mutual consent between customer 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. Controls on substances of environmental concern

Complete Halogen-free

Complies with EU RoHS directive

[1] The maximum rating

	Item	Symbol	Rating	Remark
1	Storage temperature range	T_stg	-55~+125°C	
2	Maximum drive level	DL max.	1.0 μ W max.	

[2] Recommended Operating Condition

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

[3] Electrical -Characteristics

Measurement temperature : 25±2°C

	Item	Symbol	Specifications	Conditions
1	Nominal frequency	f_nom	32.768 kHz	mode : Fundamental
2	Frequency tolerance	f_tol	$\pm 20 \times 10^{-6}$	
3	Load capacitance	C _L	12.5 pF	
4	Motional resistance	R ₁	50 k Ω max.	Measured with KEYSIGHT TECHNOLOGIES Impedance analyzer. OSC LEVEL = 0.1V
5	Q-value	Q	40×10^3 min.	calculated with the following equation : $Q = (2\pi \cdot F_r \cdot L_1) / R_1$
6	Motional capacitance	C ₁	2.2 fF typ.	
7	Shunt capacitance	C ₀	1.0 pF typ.	Measured with KEYSIGHT TECHNOLOGIES Impedance analyzer. OSC LEVEL = 0.1V
8	Turnover temperature	T _i	$25 \pm 5^\circ\text{C}$	Measure this coefficient by the frequency at 5 points of -40°C, -20°C, 25°C, 60°C, 85°C
9	Parabolic coefficient	B	$(-0.035 \pm 10\%) \times 10^{-6} / \text{C}^2$	
10	Frequency ageing	f_age	$\pm 3 \times 10^{-6} / \text{year}$	25±3°C, First year
11	Insulation resistance	IR	500 M Ω min.	Measured with KEYSIGHT TECHNOLOGIES 4329A Insulation Resistance Meter in between the electrode, and in between the electrode and case. Apply DC100V.

[4] Reliability

No	Item	Specifications	Conditions	
1	High temperature storage	$\Delta f/f = \pm 5 \times 10^{-6}$	After storage under 85°C for 500 hrs, measure at room temperature. IEC60068-2-2	*1
2	Low temperature storage	$\Delta f/f = \pm 5 \times 10^{-6}$	After storage under -40°C for 500 hrs, measure at room temperature. IEC60068-2-1	*1
3	High temperature and high humidity storage	$\Delta f/f = \pm 5 \times 10^{-6}$	After storage under 60°C ± 2°C, 90 to 95% RH for 500 hrs, measure at room temperature. IEC60068-2-78	*1
4	Temperature cycle	$\Delta f/f = \pm 5 \times 10^{-6}$	Measured at room temperature after 20 cycles. -40°C ↔ +85°C for 30 minutes. IEC60068-2-14	*1
5	Mechanical shock resistance	$\Delta f/f = \pm 5 \times 10^{-6}$	3 times of free drop onto a wooden board from height of 75cm. Measure after 2 hours left at room temperature IEC60068-2-31	*2
6	Vibration resistance	$\Delta f/f = \pm 5 \times 10^{-6}$	Amplitude 1.5mm and 10~60Hz with cycle time 2~3 minutes in 3 direction (X, Y, and Z axis) each for 2 hrs. IEC60068-2-6	*2
7	IR Reflow	$\Delta f/f = \pm 10 \times 10^{-6}$	Measure after 1 time reflow under reflow profile specified in page 10 IEC60068-2-58	*1

Note:

1. The above tests no. 1 to 7 must be conducted independently (not series tests)
2. *1: Measure after 24 hours left at room temperature .
3. *2: Measure after 2 hours left at room temperature .
4. R1 is 70kΩ max. after the each above tests.

[5] Precautions

(1) Recommended mounting conditions

Reflow profile	As per reflow profile shown in page 10.
Manual soldering	350°C 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.

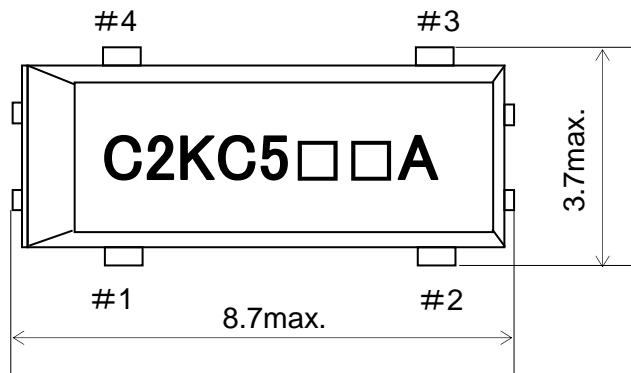
[6] Outgoing inspection standard

- The outgoing inspection shall be conducted as per the following standard .
- The sampling shall be performed according to the ANSI/ASQCZ1.4-1996 .

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

[7] Dimensions and Marking Layout

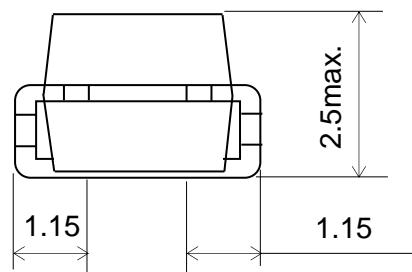
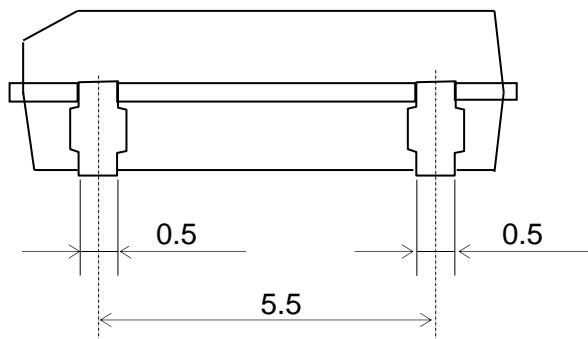
1. Mechanical dimensions



2. Marking

C2K C5 A
 *1 *2 *3 *4

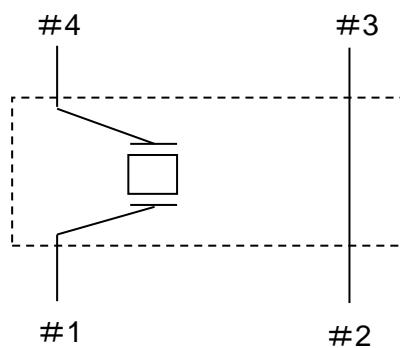
*1 Frequency
 *2 Specification
 *3 Mfg. Year
 Last digit of year
 *4 Mfg. Month
 Jan.~Dec. : A~M
 (excluding I)



* The part of the cylinder inside resin mold may be sometimes exposed, however, it does not affect the characteristics of crystal unit.

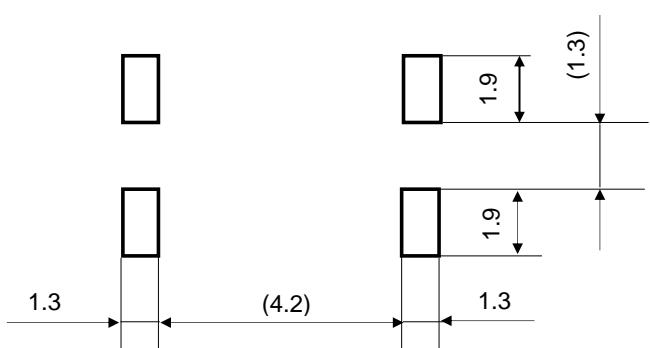
3. Lead connection

Do not connect Terminals #2, #3 to the outside electrode.
 These are dummy terminals.



4. Recommendation soldering pattern figure.

* Please make sure that there is no pattern under SP-T2A-F on the circuit board.



Materials	42 Alloy Sn(100%)	Remarks	Unit 1=1mm
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[8] Taping specification

1. Drawing of tape dimensions

- ① Carrier tape see Drawing No. 8/11
- ② Reel for carrier tape see Drawing No. 9/11

2. Material

- ① Carrier tape : Polystyrene
- ② Reel for carrier tape : HIPS

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

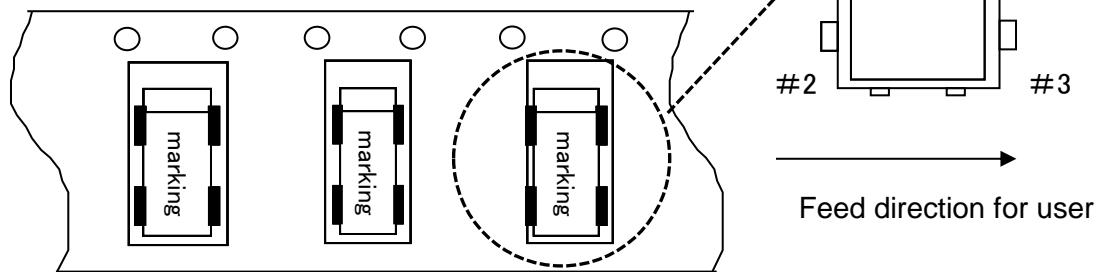


Fig. 1

(2) Reel

- ① On the side of reel there shall be more than 20 blocks of "No components".
- ② The beginning of Carrier Tape shall be bent vertically and hooked on groove of reel.

(3) Leader

- ① On the side of leader, there shall be more than 20 blocks of "No components"
- ② The length of Leader shall be over 400 mm.
- ③ The Length of Stick Tape for Cover Tape shall be about 100 mm and Stick Tape shall never be detached.

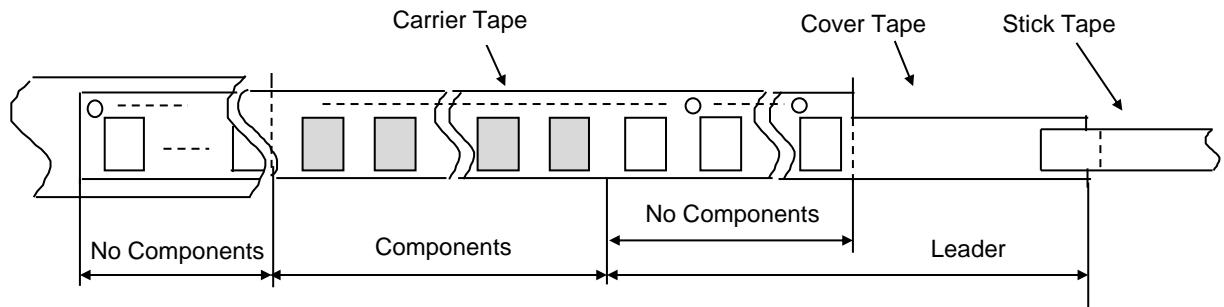
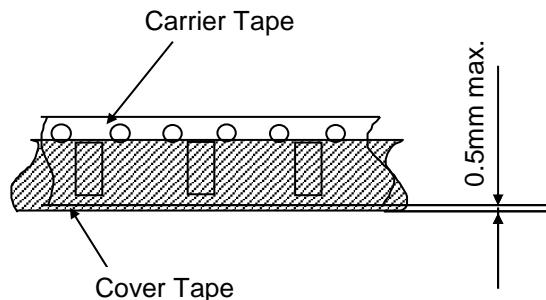


Fig. 2

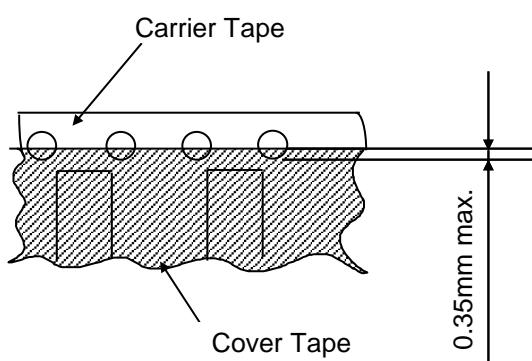
Feed direction for user

(4) Gap between Carrier Tape and Cover Tape

- ① Cover Tape protrudes from Carrier Tape by 0.5mm max.

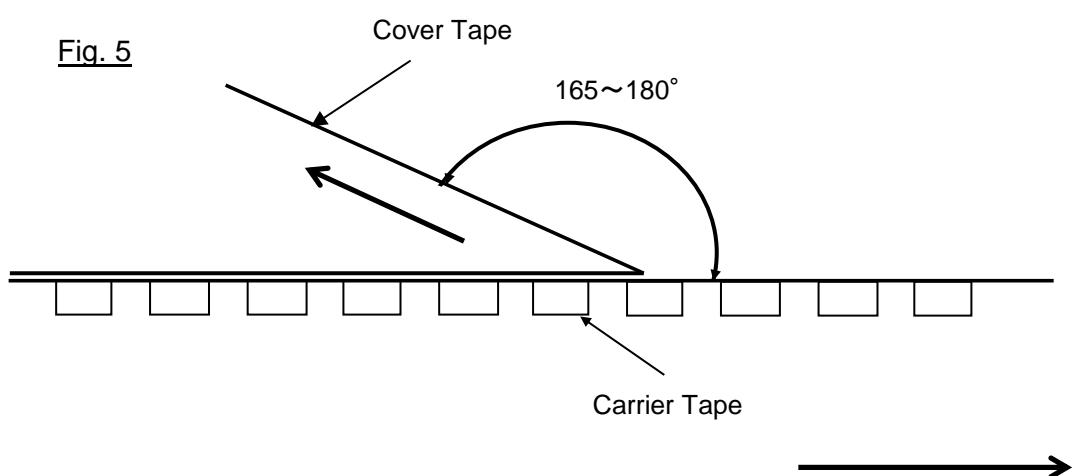
Fig. 3

- ② Holes of Carrier Tape are covered with Cover Tape by 0.35mm max.

Fig. 4

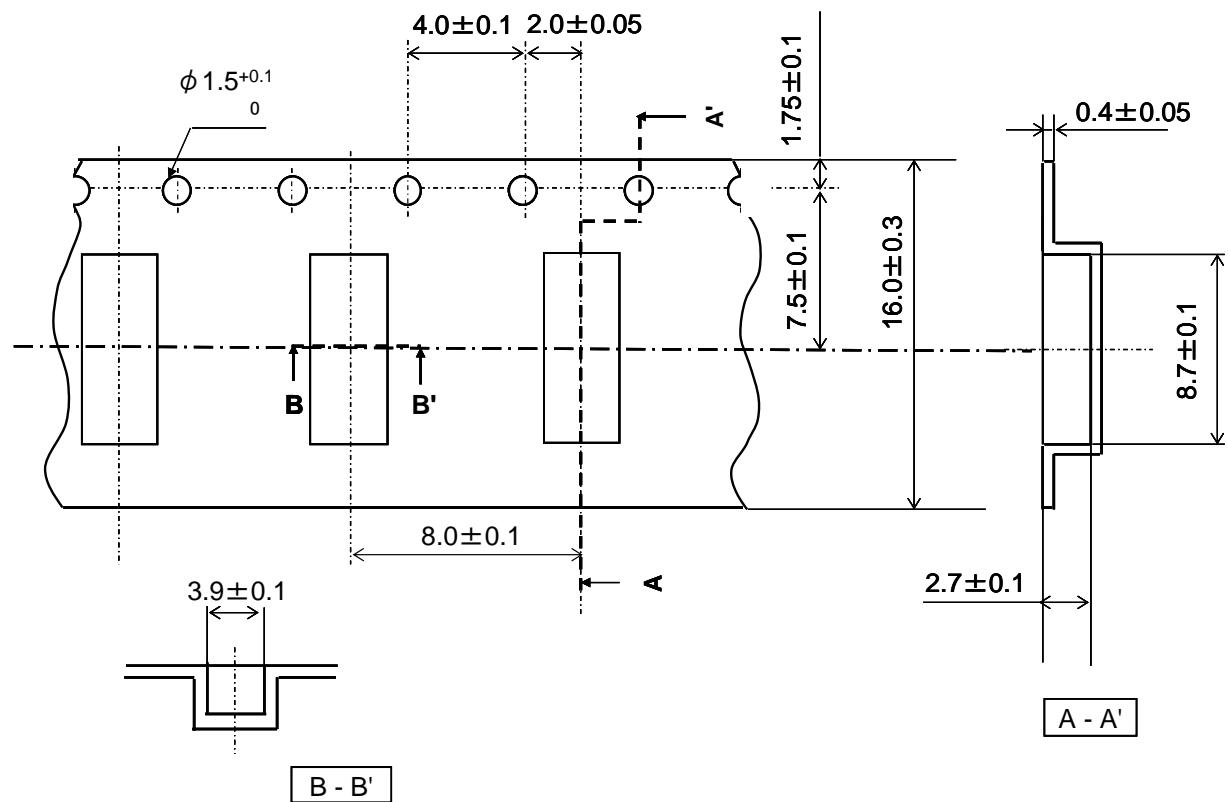
(5) Peel strength

- ① The method of testing is done as shown below.
- ② The value of force is at the beginning of desealing.
- ③ The Cover Tape peel forth shall be $0.1 \sim 1.3\text{N}$ at a peel speed of $300 \pm 10\text{mm/min}$.

Fig. 5

Carrier tape

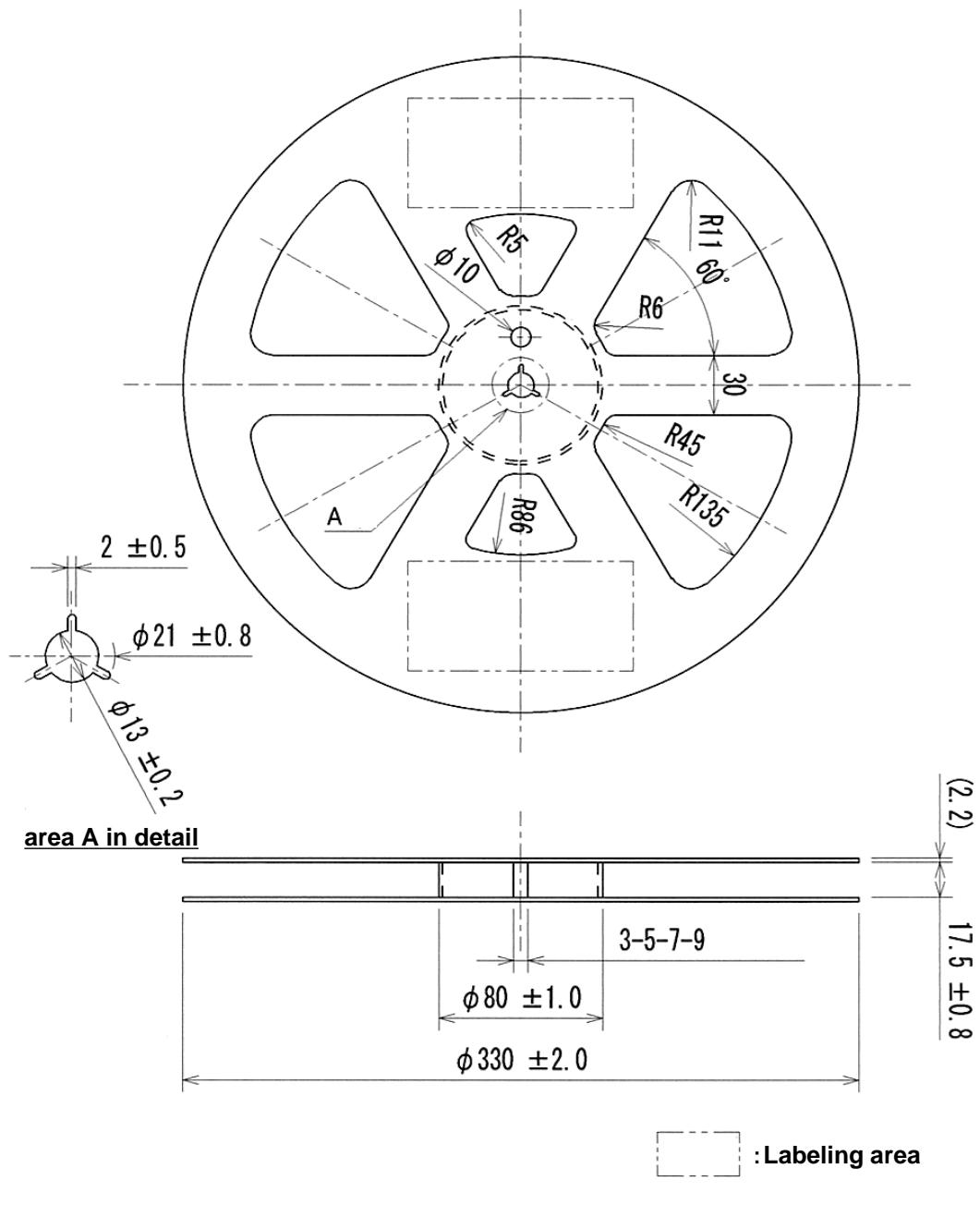
(1) Conforms with EIA-481



Unit=mm

Taping reel

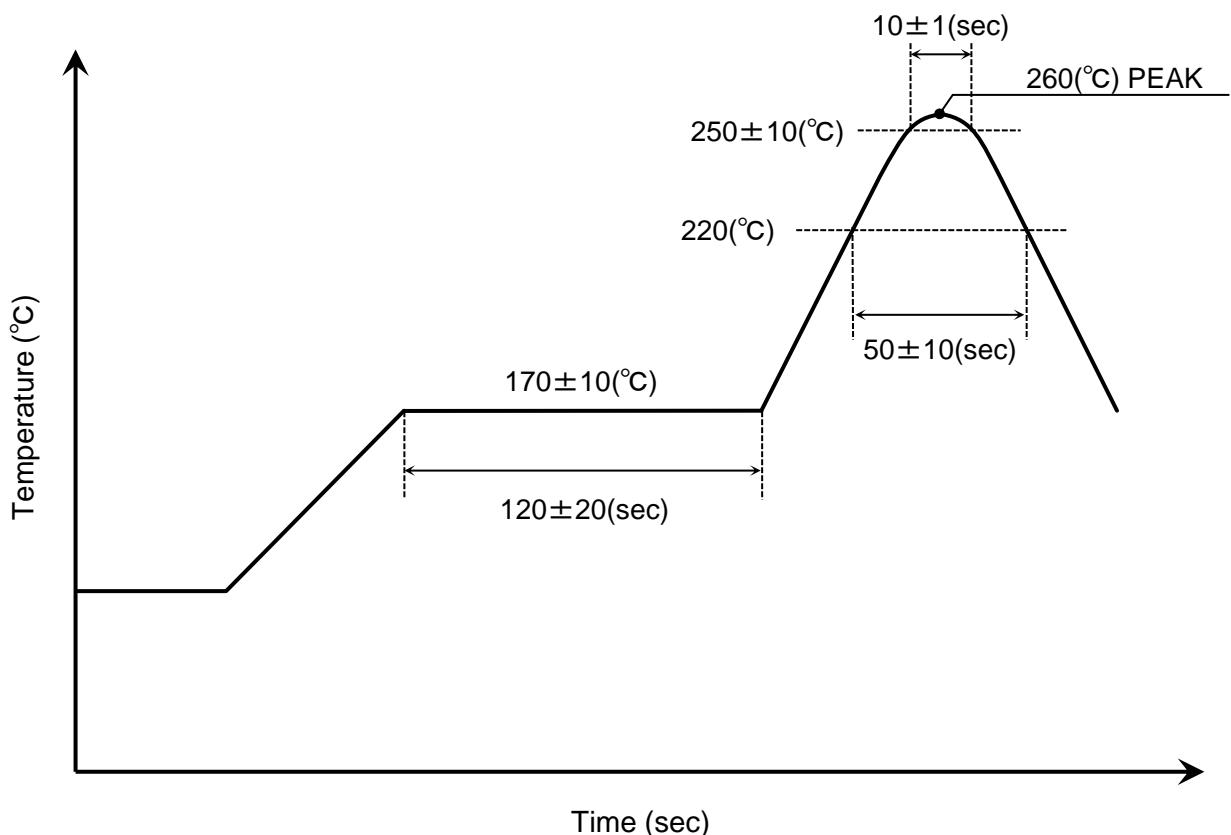
(1) Conforms with EIAJ ET-7200B
 (2) Quantity per reel : 3,000pcs./ for a reel



[9] Reflow Profile

Pre-heating temperature : +170°C
 Heating temperature : +220°C

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] Packing Specification

1. A label is attached on each reel.

2. To insert it in the corner bottom Polyethylene bag.

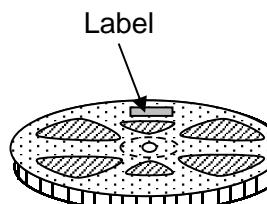


Figure.1

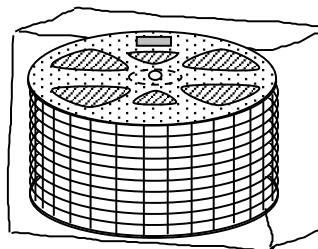


Figure.2

Packed in an antistatic bag

3. Box size and reels

Outside Box	K2	K1	T1
Maximum reels	5	10	20

4. An outer case packing structure (the sectional plan)

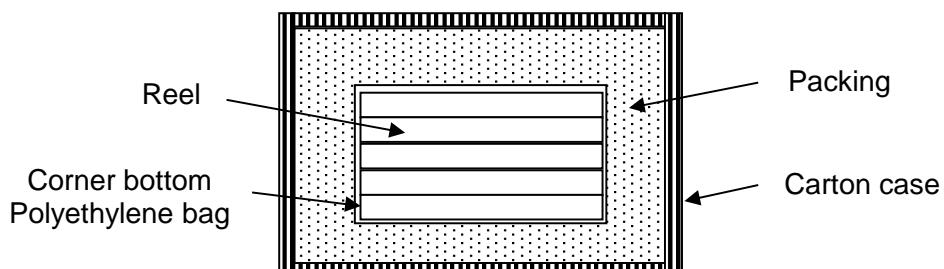
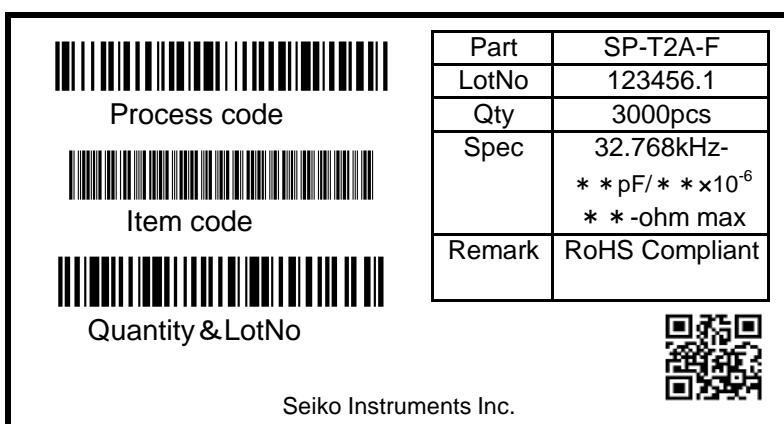


Figure.3

5. Reel Label (please refer to Figure1, Figure2)



Part : SII product name
 Lot No : Lot No
 Qty : Quantity
 Spec : Frequency, CL, F0 deviation, R1value

Remark : Environment adaptability, etc.

2 dimensional barcode:
 Shipment inspection date
 Marking code

6. Storage environment

A product avoids the direct ray and please store with the normal temperature and humidity .

•Temperature : +15 to 35 °C •Humidity : 25 to 85%RH