

# SPECIFICATIONS

FOR

## SP-T2A ( 32.768 KHz ) QUARTZ CRYSTAL RESONATOR

Spec. No. spt2a01917

Customer : Standard Spec : ±20ppm/12.5pF

Approved by : \_\_\_\_\_

Name : \_\_\_\_\_

Title : \_\_\_\_\_

Date : \_\_\_\_\_

It is our pleasure to submit to you 1 copy of the specifications.

Please return    copies for our file, duly signed by you in the space provided above.

Seller : Seiko Instruments Inc.

Approved by : \_\_\_\_\_

Name : \_\_\_\_\_

Title : \_\_\_\_\_

Date : \_\_\_\_\_

Address : 1-8, Nakase, Mihama ku, Chiba shi, Chiba 261-8507 Japan

Phone No. : 043(211)1207

Fax No. : 043(211)8030

Manufacturer : SII Quartz Techno Ltd.

Approved by : \_\_\_\_\_

Name : Isamu Ikeda

Title : Quality Assurance Section

Date : 27th. April / '01

Address : 1110, Hirai cho, Tochigi shi, Tochigi 328-0054 Japan

Phone No. : 0282(24)1215

Fax No. : 0282(24)2700

## 1.Scope

These specifications apply to QUARTZ CRYSTAL RESONATORS ( hereinafter referred to as RESONATORS ) to be manufactured by SII Quartz Techno Ltd. ( hereinafter referred to as SQT ) and to be supplied by Seiko Instruments Inc. ( hereinafter referred to as SII ) to **XXX Co., Ltd.**

## 2.Designation

RESONATORS are designated " **SP-T2A**"(32.768KHz ).

## 3.Shape and dimensions

As per the **SP-T2A** drawing shown on page 7 .

## 4.Electrical characteristics

Specified on page 3 through 4.

## 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 SQT's resonator packaging standards.

## 6.Outgoing inspection

- 6.1 When mutually agreed, the outgoing inspection shall be conducted as per the standard on page 6.
- 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 **XXX Co., Ltd.** and that any defect resulting from failures in process-control at SII after after incoming inspection is found, good RESONATORS shall be supplied to **XXX Co., Ltd.** 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 **XXX Co., Ltd.** 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.

### Note:

The products described herein are consumer goods and not designed for application in life-sustaining equipment or other devices requiring very high-reliability Seiko Instruments Inc. shall not bear any responsibilities arising out of or in connection to the use of the products contained herein for those applications.

**Electrical characteristics****4.1 Specification**

Measurement temperature : room temperature 25±2

No	Item	Symbol	Specification	Measurement conditions
1	Oscillating frequency	$f_0$ $f / f_0$	32.768 KHz  ±20 ppm	As per the SII's standard circuit (see page5).
2	Load capacitance	CL	12.5 pF	
3	Equivalent resistance (CI value)	$R_1$	50 K max.	Measured with ATI 4192A impedance analyzer.
4	Q-value	Q	$40 \times 10^3$ min.	Calculated with the following equation: $Q = (2 \cdot f_r \cdot L_1) / R_1$
5	Equivalent capacitance	$C_1$	2.1 fF typ.	
6	Parallel capacitance	$C_0$	1.0 pF typ.	Measured with ATI 4192A impedance analyzer.
7	Turning point	$T_p$	$25 \pm 5$	Measure this coefficient at 3 points of 17 , 25 and 33 using C-MOS circuit.
8	Secondary temperature coefficient.	K	$(3.5 \pm 0.8) \times 10^{-8} / ^\circ C^2$ max.	
9	Amount of aging	$f / f_0$	±5 ppm / year	Measured with C-MOS circuit.
10	Drive level	DL	1 μW max.	
11	Insulation resistance		Between electrodes: 500M min. Between electrodes and case: 500M min.	Measure with ATI 4329A Insulation Resistance Meter. Apply DC100V.

(continued)

No	Item	Specification	Measurement conditions
12	Operating temperature range	-40 ~ +85	
13	Storage temperature range	-55 ~ +125	
14	High temperature storage	f/f =±5ppm max.	After storage under 85 for 500 hrs, measure at room temperature. *1
15	Low temperature storage	f/f =±5ppm max.	After storage under -40 for 500 hrs, measure at room temperature. *1
16	High temperature and high humidity storage	f/f =±5ppm max.	After storage under 60 ±2 , 90 to 95% RH for 500 hrs, measure at room temperature. *1
17	Thermal shock resistance	f/f =±5ppm max.	Measured at room temperature after 20 cycles. -25 +80 for 30 minutes. *1
18	Mechanical shock resistance	f/f =±5ppm max.	Measure after free drop of the RESONATOR three times from the height of 75cm onto a wooden board. *2
19	Vibration resistance	f/f =±5ppm max.	Amplitude 1.5mm and 10 ~ 60Hz with cycle time 2 ~ 3 minutes in 3 direction (X,Y,and Z axis)each for 2 hrs. *2
20	IR Reflow	f/f =±5ppm max.	Measure after reflow under reflow profile specified in page 12. *1

**Note:**

1. The above tests no.14 to 20 must be conducted independently (not series tests).
2. \*1: Measure after 24 hours soak at room temperature .
3. \*2: Measure after 2 hours soak at room temperature .
4. R1 is 60K max. after the each above tests.

**10. Precaution in handling**

**10-1. Recommended mounting conditions**

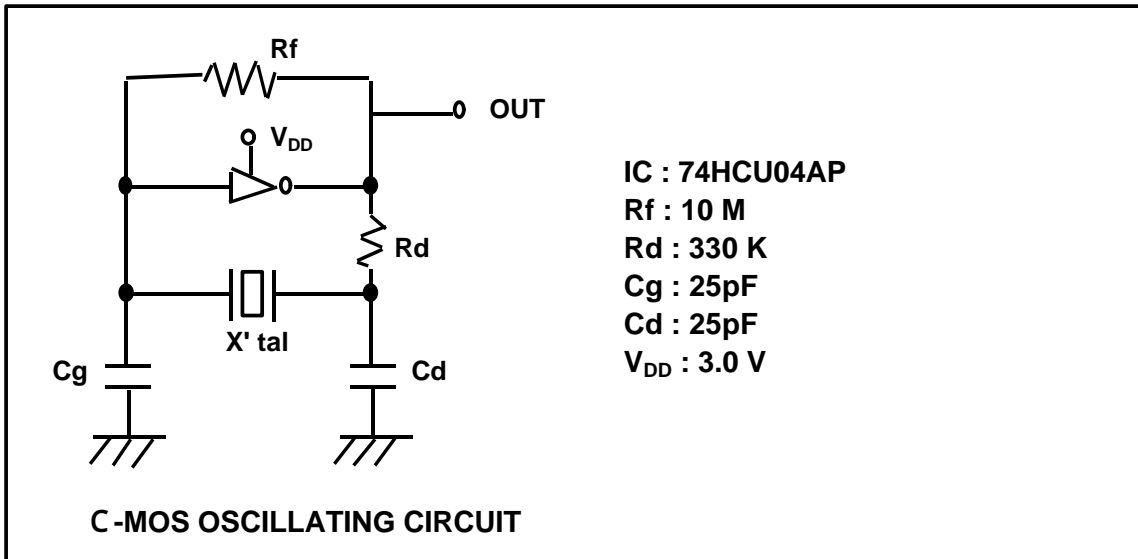
Reflow profile      As per reflow profile shown in page 12.  
 Manual soldering    350    max. for 4 sec. max.  
                                  Heat only to the terminals.  
                                  Must not heat the crystal unit body.

**10-2. Cleaning**

Other crystal units may also break depending upon the ultrasonic cleaning condition. Please check the ultrasonic cleaning condition.

**11. Others**

11-1. Dimensions :      As per the drawing shown on page 7.  
 11-2. Appearance :    As per boundary sample.  
 11-3. Standard circuit.



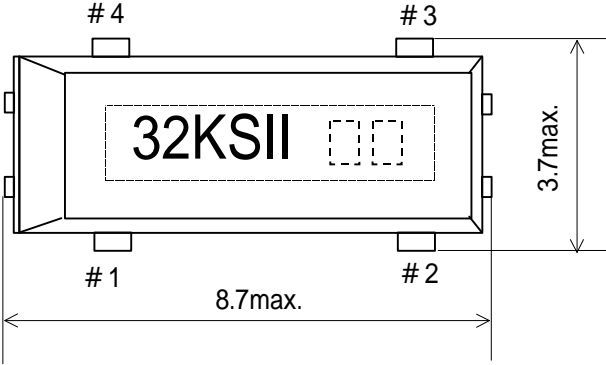
## Outgoing inspection standard

- The outgoing inspection shall be conducted as per the following standard .
- The sampling shall be performed according to the ANSI/ASQCZ1.4-1993 .

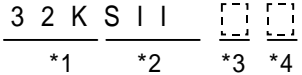
No	Item	Sampling level	AQL(%)
1	Frequency tolerance		1.0
2	Series resistance		1.0
3	Outer appearance		1.5
4	Others characteristics	Periodical quality inspection	

Mechanical dimensions & Marking

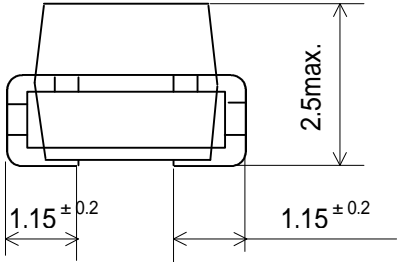
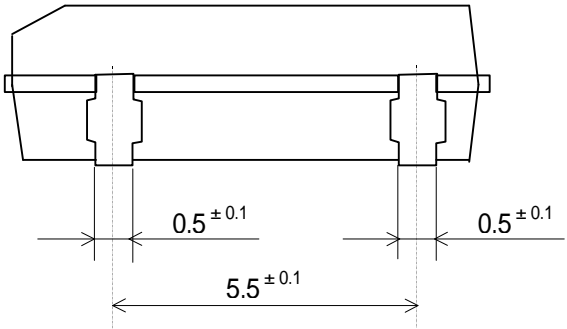
1 Mechanical dimensions



2 Marking

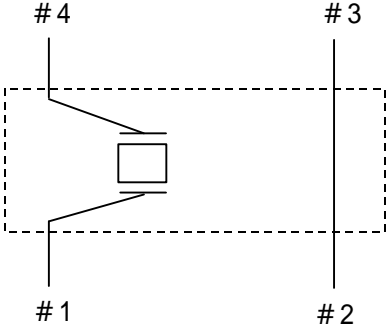


- \*1 Frequency
- \*2 S E I K O
- \*3 Mfg. Month  
Jan. ~ Dec. : A ~ M  
(excluding I)
- \*4 Mfg. year  
Last digit of year



3 Lead connection

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



Materials	(Fe42%-Ni) (SnPb 9:1)	Remarks	Unit 1 = 1 mm
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## Taping specification

- 1 . Drawing of tape dimensions  
 Carrier tape see Drawing No. SP-T2-02  
 Reel for carrier tape see Drawing No. SP-T2-01

- 2 . Material  
 Carrier tape : Polystyrene  
 Reel for carrier tape : Corrugated paper

- 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

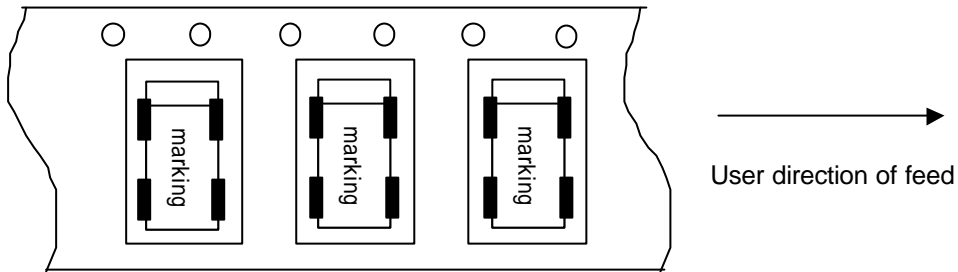


Fig. 1

- (2) Reel  
 On the side of reel there shall be more than 10 blocks of "No components".  
 The beginning of Carrier Tape shall be bent vertically and hooked on groove of reel.

- (3) Tape Leader  
 On the side of leader, there shall be more than 10 blocks of "No components"  
 The length of Cover Tape shall be over 150 mm.  
 The Length of Stick Tape for Cover Tape shall be about 100 mm and  
 Stick Tape shall never be detached.

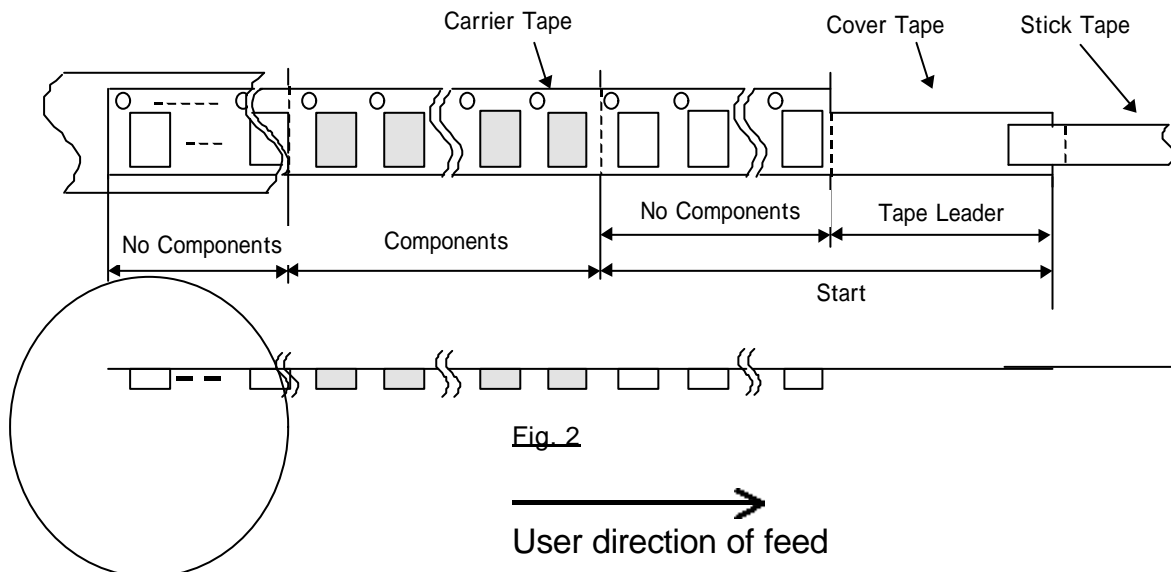
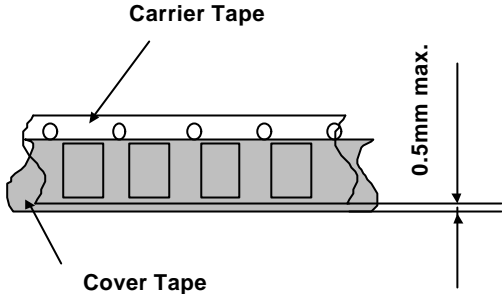


Fig. 2



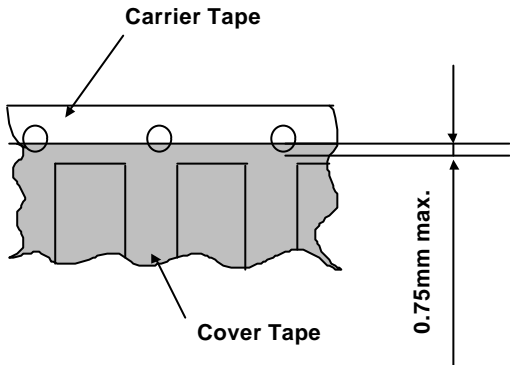
- (4) **Gap between Carrier Tape and Cover Tape**  
Cover Tape protrudes from Carrier Tape by 0.5mm max.

**Fig. 3**



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

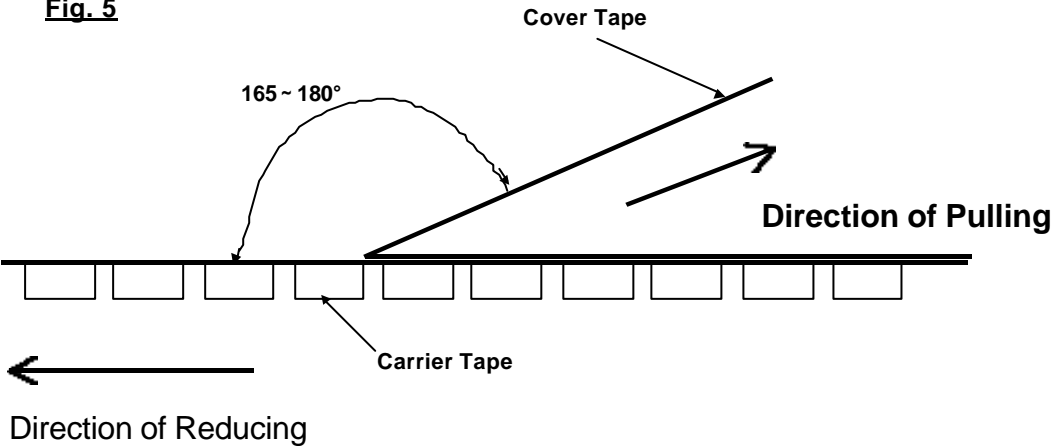
**Fig. 4**



- (5) **Peel strength**

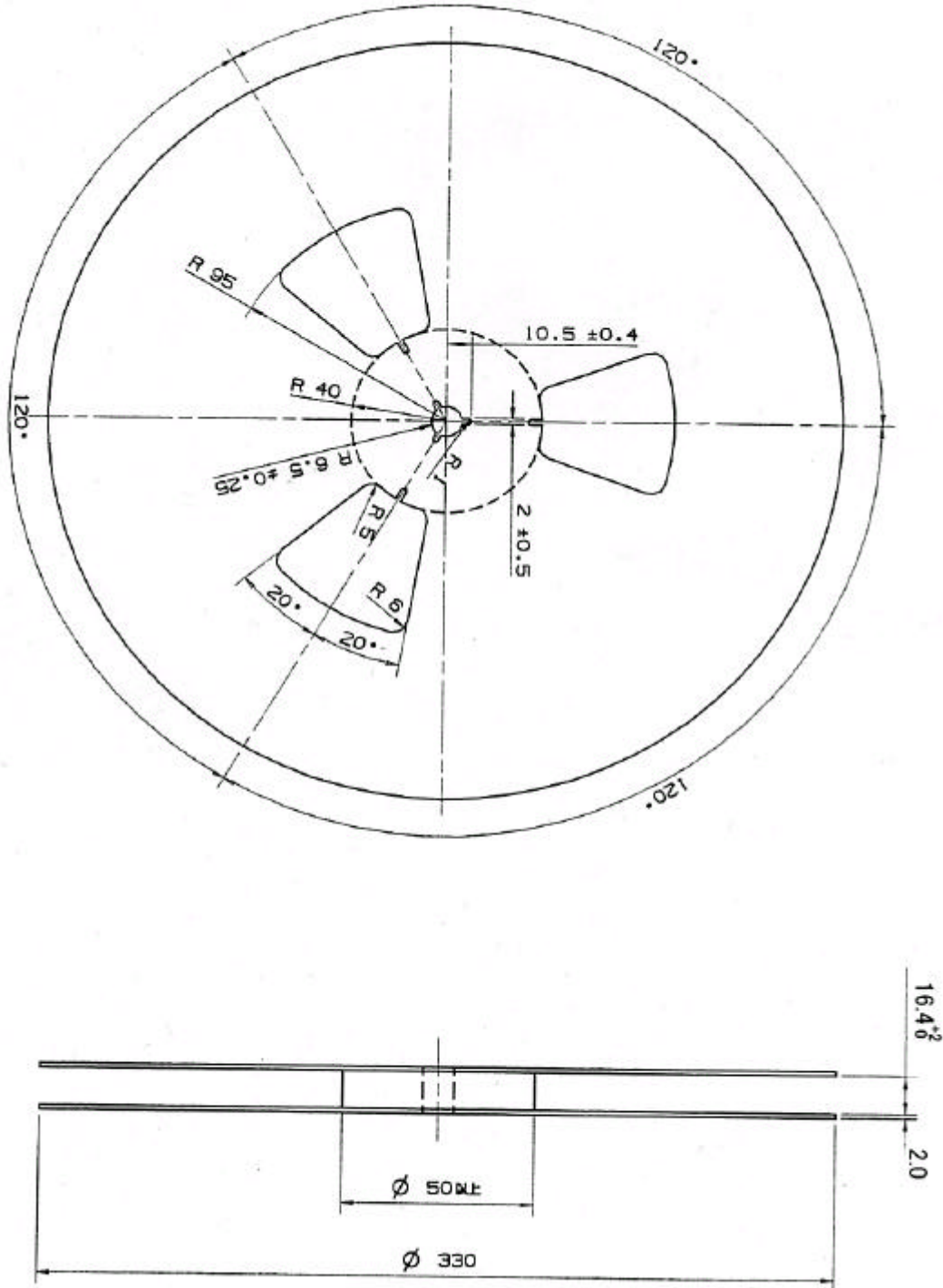
The method of testing is done as shown below.  
The value of force is at the beginning of desealing.  
The Cover Tape peel forth shall be 0.1 ~ 1.3N at a peel speed of 300±10mm/min.

**Fig. 5**



# Taping reel specification

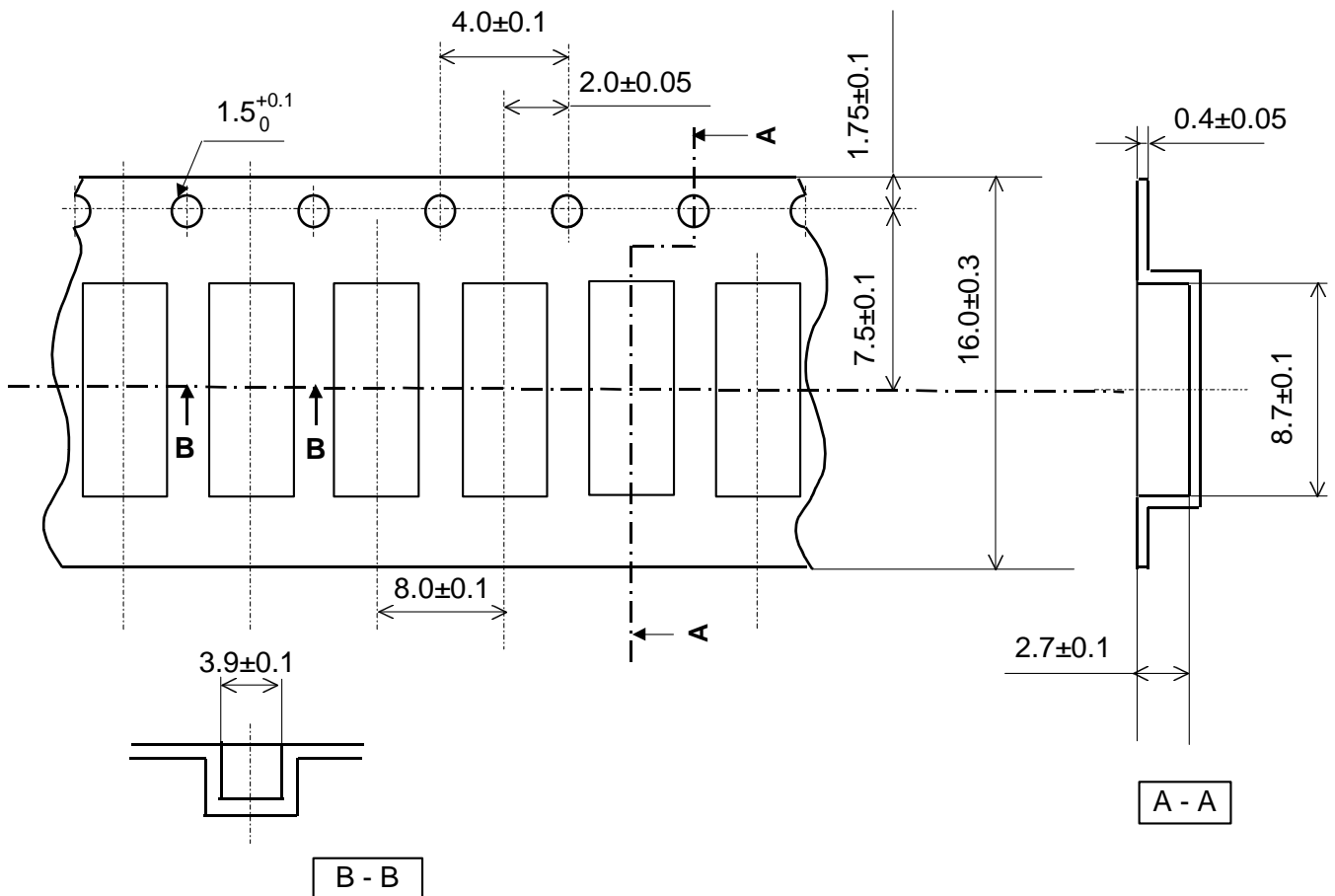
- (1) Per EIAJ RC - 1009B
- (2) Quantity per reel : 3,000pcs./for a reel



Drawing No. SP-T2-01  
1=1mm

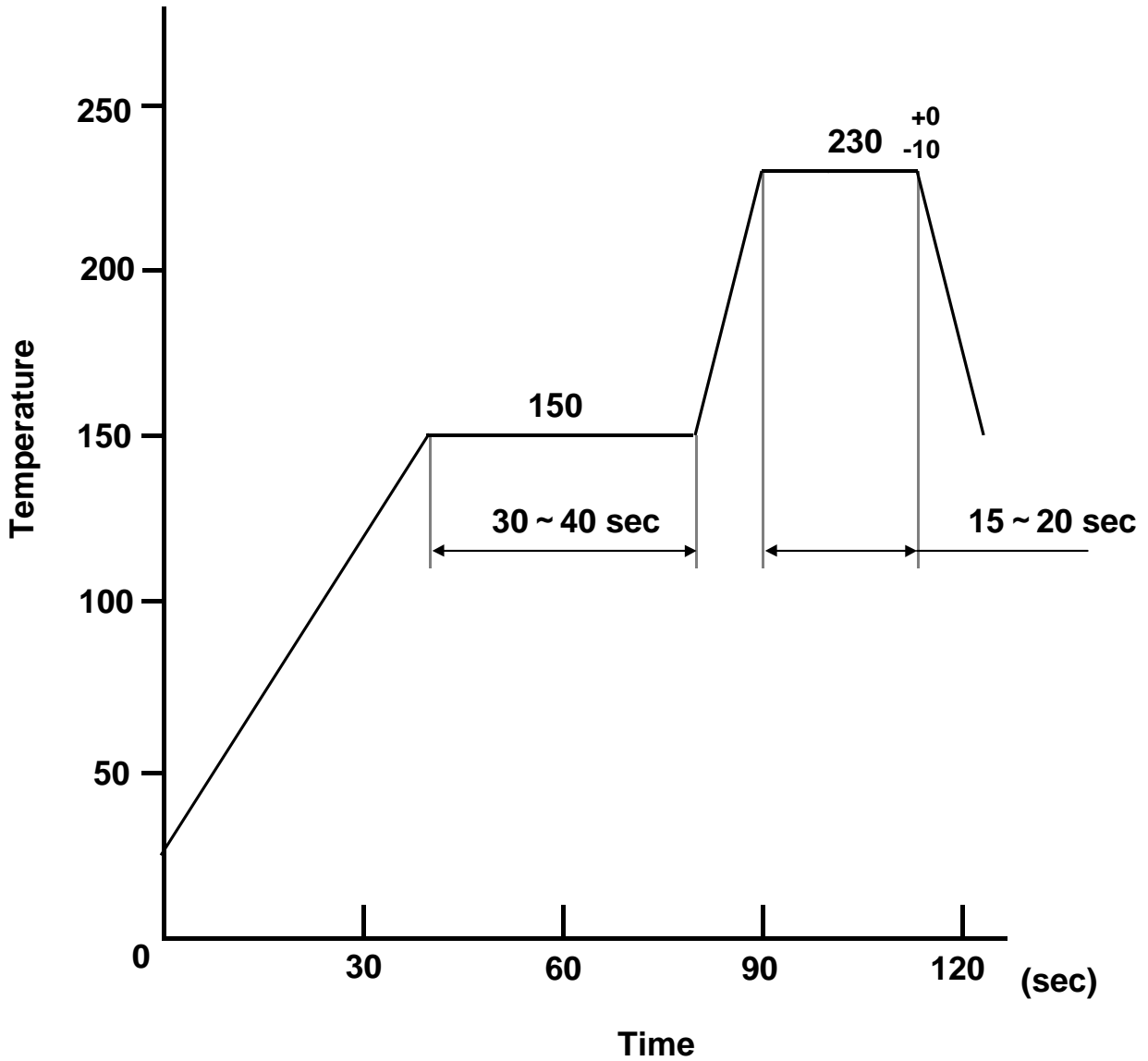
# Carrier tape specification

- (1) Per EIAJ RC - 1009B
- (2) Inner corner R = 0.3 mm x .
- (3) Taper for dis-set at each corner = 3° mm x .
- (4) Tolerance  $\pm 0.2$



Drawing No. SP-T2A-02  
**1=1mm**

## Reflow Profile



**Note:**The temperature used herein means the temperature on the circuit board.