INFORMATION

Model : SG-771PCD

DATE : Apr. 1. 2014

SEIKO EPSON CORPORATION

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399-4696 Japan

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.

SPECIFICATIONS

1. Application

1) This specifications apply to Crystal oscillator SG-771PCD-125.002500-L.
2) This product is compliant with RoHS Directive.
3) This Product supplied (and any technical information furnished, if any) by SEIKO EPSON CORPORATION. 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.
4) 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.

2. Product No. / Model

The model is SG-771PCD-125.002500-L

3. Packing

It is subject to the packing standard of SEIKO EPSON CORPORATION.

4. Warranty

Defective parts which are originated by us are replaced free of charge in case defects are found within 12 months after delivery.

5. Amendment and abolishment

Amendment and/or abolishment of this specification are subject to the agreement between both parties.

6. Contents

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[1] Absolute maximum ratings

Parameter	Symbol	Value	Unit	Note
Supply voltage	VCC	-0.5 to +6.0	V	
Input voltage	VIN	-0.5 to VCC+0.5	V	
Storage temperature *	T_stg	-55 to +125	°C	Stored as bare product after unpacking.

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

[2] Operating range

Parameter	Symbol	Value			Unit	Note	
		Min.	Typ.	Max.			
Supply voltage	VCC	3.135	3.300	3.465	V	*1	
Supply voltage	GND	0.0	0.0	0.0	V		
Output frequency	fo	―	125.0025	―	MHz		
Operating temperature	T_use	-40	―	+85	°C	L	
Output load condition	L_ECL		50		ohm		

*1 Start up time(0 %VCC→90 %VCC) of power source should be more than 150 μs.

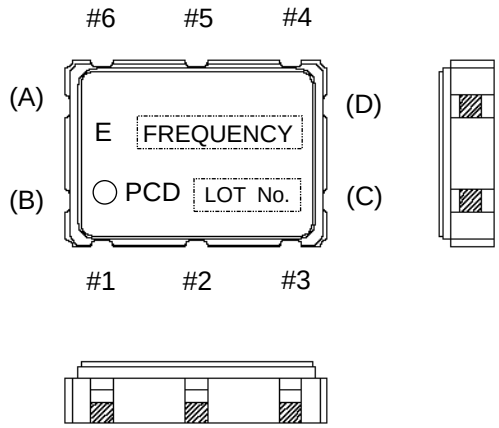
[3] Frequency characteristics

Output frequency (fo) ..... 125.002500 MHz

Parameter	Symbol	Value[1×10^{-6}]	Note
Frequency tolerance *	f_tol	± 30	T_use= -40 °C to +85 °C

* This includes initial frequency tolerance, temperature variation, supply voltage variation, and 1 year aging (at +25 °C).

[4] Terminal description



Name	No.	Type	Terminal description
DNC	#1	–	Please do not connect DNC(#1) of the terminal with patterns such as power supplies and GND.
DNC	#2	–	Please do not connect DNC(#2) of the terminal with patterns such as power supplies and GND.
GND	#3	–	GND terminal
OUT	#4	OUTPUT (Positive)	Clock out terminal
OUT	#5	OUTPUT (Negative)	Clock out terminal. Inversion output of #4
Vcc	#6	–	Vcc terminal

* The metal part of the surface (metal cap) is connected to GND.
* Please use DNC pin with no connection.

[5] Electrical characteristics

(measuring condition T=+25°C,Vcc=+3.3V)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ	Max		
Start up time	t_str	–	–	10	ms	
Current consumption	Icc	–	–	100	mA	OE=Vcc , RL=50Ω
Rise time *1	tr	–	–	0.8	ns	20 % to 80 % output swing
Fall time *1	tf	–	–	0.8	ns	80 % to 20 % output swing
Symmetry *1	SYM	45	–	55	%	Vcc-1.3V
High level output voltage	V_{OH}	Vcc-1.025	–	Vcc-0.880	V	
Low level output voltage	V_{OL}	Vcc-1.810	–	Vcc-1.620	V	

Please see [6] Test circuit.

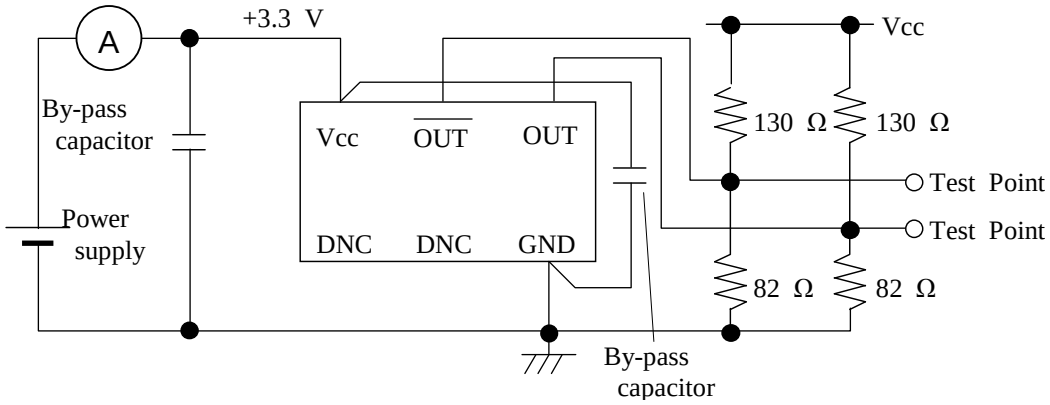
*1 Please see [7] 1) Output waveform.

Phase Jitter Characteristic

Phase Jitter = 0.5 ps max (12 kHz to 20 MHz)

[6] Test circuit

1) To observe waveform and current



* Each output line is same length.
* Please use DNC pin with no connection.

2) Measurement condition

(1) Oscilloscope

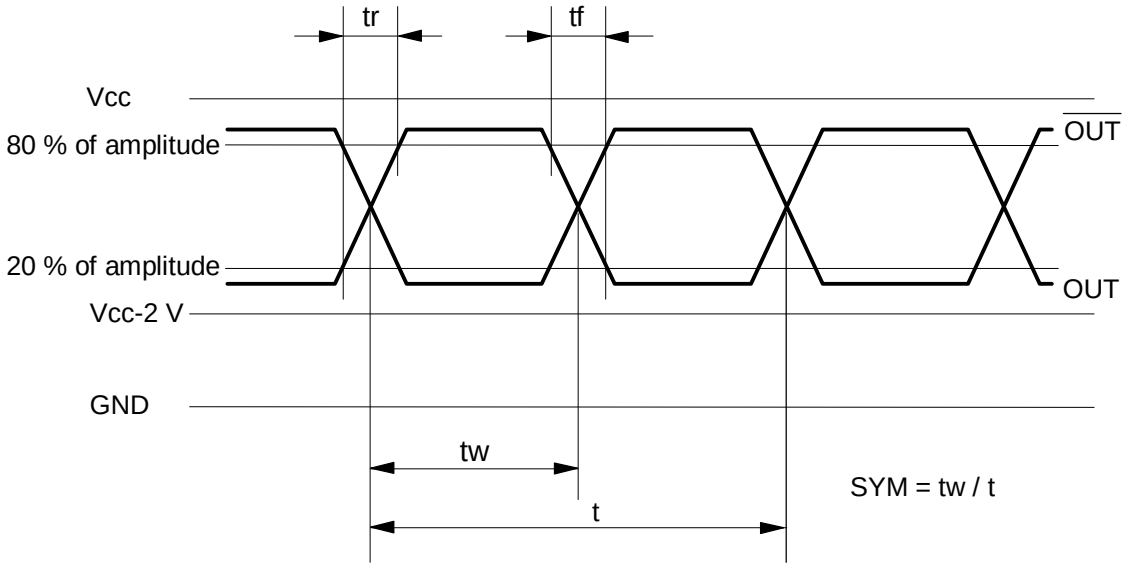
• Bandwidth should be 5 times higher than DUT's output frequency. (1 GHz)
• Probe ground should be placed closely from test point and lead length should be as short as possible.

(2) By-pass capacitor 1 (approx. 0.01 μF to 0.1 μF) places closely between Vcc and GND.
(3) By-pass capacitor 2 (approx. 10 μF) places closely between power supply terminals on the board.
(4) Use the current meter whose internal impedance value is small.
(5) Power supply

• Start up time (0 V→90 %Vcc) of power source should be more than 150 μs.
• Impedance of power supply should be as low as possible.

[7] Timing chart

1) Output waveform



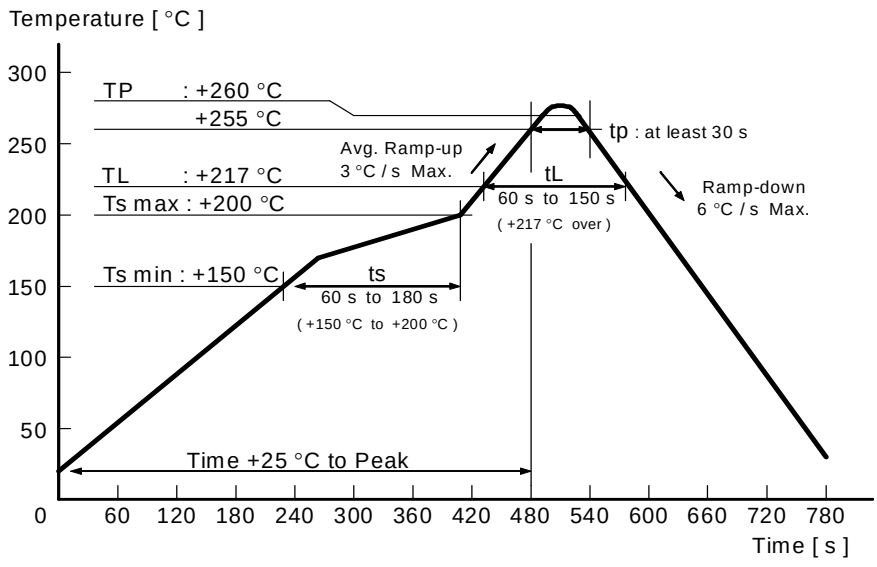
[8] Environmental and mechanical characteristics

* SEIKO EPSON CORPORATION evaluation condition
: Evaluated by the following examination items and conditions.

No.	Item	Value *1		Test Conditions
		Δ f / f *2 [1 × 10^{-6}]	Electrical characteristics	
1	High temperature bias *3	±10	Satisfy [5] specification after test	+85 °C × Vcc/Vc × 1 000 h
2	High temperature storage *3	±10		+125 °C × 1 000 h
3	Low temperature storage *3	±10		-55 °C × 1 000 h
4	High temp. humidity storage *3	±10		+85 °C × 85 %RH × 1000 h
5	Temperature cycle *3	±10		-55 °C ~ +125 °C 30 min. at each temp. 100 cycles
6	Resistance to soldering heat	±10		For conventional reflow soldering furnace (3 times) Ref. IPC/JEDEC J-STD-020D.1
7	Vibration	± 5		10 Hz to 85 Hz amplitude 1.5 mm 85 Hz to 2 000 Hz acceleration 20G 10 Hz → 2 000 Hz → 10 Hz 20 min./cycle 12 h (4 h × 3 directions)
8	Shock	± 5		1000 G 1/2 sine wave 3 shocks in X,Y,Z (Total of 9 shocks).
9	Drop	± 5		Free drop from 750 mm height on a hard wooden board for 9 times.
10	Sealing	1 × 10^{-9} Pa·m^3/s Max.		For He leak detector

< 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.
Pre-conditioning: Reflow (3 time)

Convection reflow condition (Ref. IPC/JEDEC J-STD-020D.1)



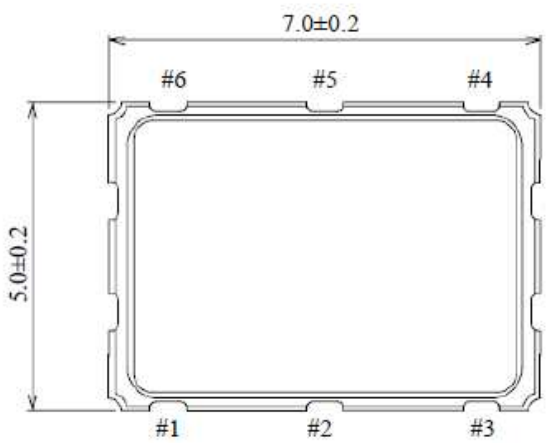
[9] Electro Static Discharge

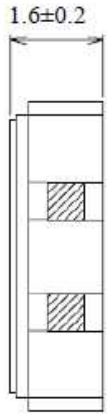
・ESD

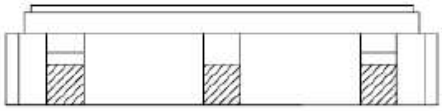
Item	Value	Condition
Human Body Model (HBM)	±2 000 V	Ref. IEC 60749-26 100 pF, 1.5 kΩ, 3 times
Machine Model (MM)	±200 V	Ref. IEC 60749-27 200 pF, 0 Ω, 1 time

[10] Dimensions and marking layout

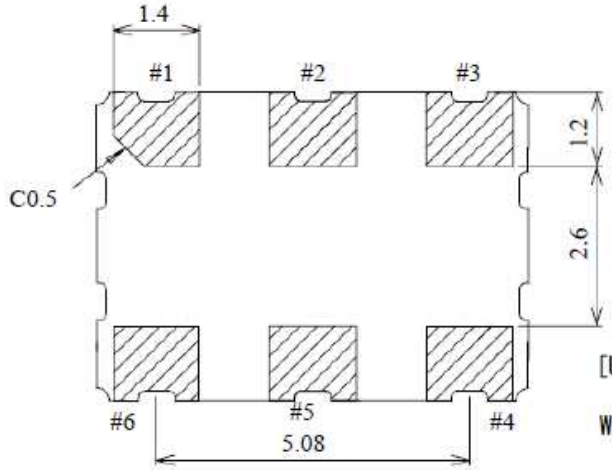
1) Dimensions







No	Name
1	DNC
2	DNC
3	GND
4	OUT1
5	OUT2
6	Vcc

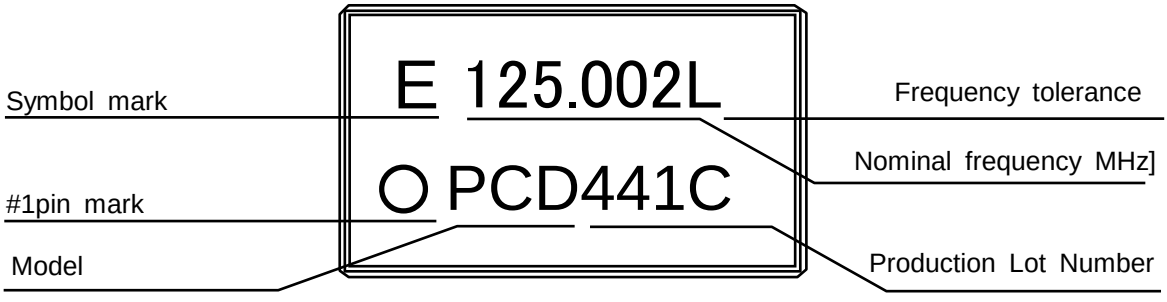


Please use DNC pin with no connection

[UNIT] mm

Warp of ceramic is in the range of 0.1 mm Max.

2) Marking layout



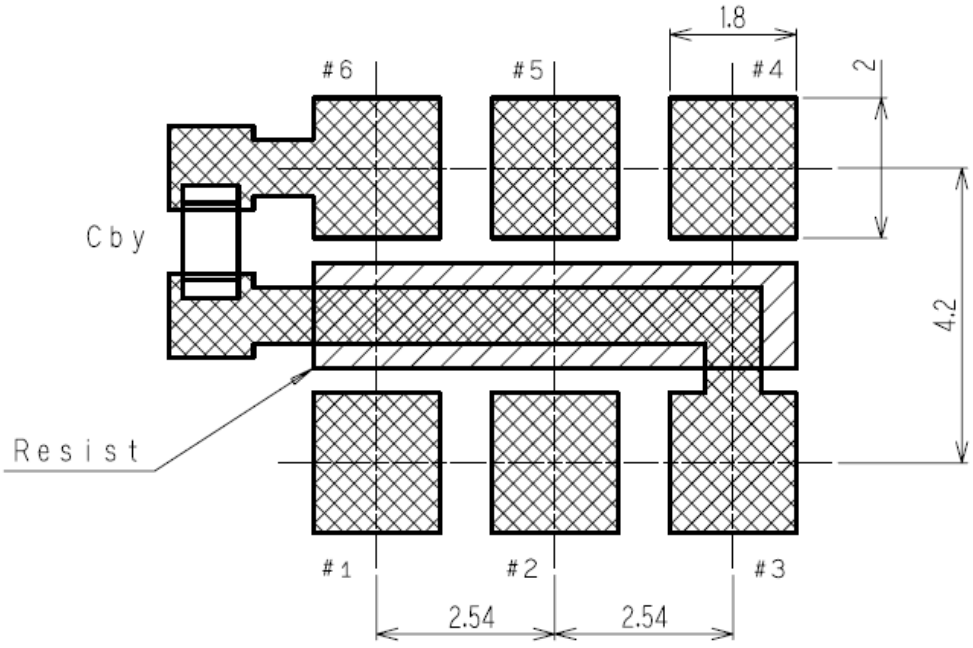
* The above marking layout shows only marking contents and their approximate position, not actual font, size and exact position.

* Nominal frequency omits the figure below the forth place of decimals.

[11] Board patterning

The soldering pad sample indicated as like following:
Soldering position (Unit : mm)

Cby = 0.01 μF ~ 0.1 μF



[12] Notes

1) This device is made with C-MOS IC.
Please take necessary precautions to prevent damage due to electrical static discharge.

2) We recommend placing a 0.01 to 0.1 μF capacitor closely between Vcc and GND to obtain stable operation and protest against power line ripple.

3) Vcc and GND pattern shall be as large as possible so that high frequency impedance shall be small.

4) SEIKO EPSON CORPORATION cannot 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) SEIKO EPSON CORPORATION doesn't recommend to power on from intermediate electric voltage or extreme fast power on. Those powering conditions may cause no oscillation or abnormal oscillation.

6) Power ripple: 200 mV P-P max.

7) Please design the two output lines as short as possible.
A long output line may cause irregular output.

8) Other high level signal lines may cause incorrect operation, so please do not place high-level signal line close to this device.

9) This device contains a crystal resonator, so please do not expose to excessive shock or vibration.

10) An automatic insertion is available, however, the internal Crystal resonator might be damaged in case that too much shock or vibration is produced mechanically.
Be sure to check your machine condition in advance.

11) Ultrasonic cleaning can be used on this product, however, since the oscillator might be damaged under some conditions, please exercise caution in advance.

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

13) The metal part of the surface (metal cap) is connected to GND #3 pin.
Please take necessary precautions to prevent short circuit to GND by contact with the metal cap.

14) Side leads (A) to (D) are connected to IC internally.
Therefore be careful for short or a fall of insulation resistance etc.

15) Please use DNC pin with no connection.

16) Recommendation reflow times are less than 2 times.
When there was a soldering error, please do alteration with a soldering iron.
In this case, the iron ahead is equal to or less than +350 °C and asks within 5 s.
In case that this device is reflow soldered on the back side of your circuit board, please carefully verify the device is properly secured to prevent coming detached from card.

[About soldering method]

Soldering method	OK or NG
Reflow soldering (top side)	OK
Reflow soldering (back side)	Please carefully verify the device is properly secured to prevent coming detached from card.
Solder pot (static solder pot / flow solder pot)	NG
Iron soldering	OK

17) Aging in the frequency tolerance is from environmental tests results to the expectation of the amount of the frequency variation.

18) Please do not place signal lines and supply voltage lines on the area, its internal layers, and the bac k side of where the oscillators are soldered. This may affect the performances of the oscillators.

19) We will announce the discontinuance and switch to our successor before six months or more.

TAPING SPECIFICATION

I. Application

This document is applicable to VG-45**CA / VG7050E*N / SG-77****

Ⅱ. Contents

Item No	Item	Item
[1]	Taping specification	1 to 2
[2]	Inner carton	3
[3]	Shipping carton	4
[4]	Marking	
[5]	Quantity	
[6]	Storage environment	

[1] Taping specification

(1) Tape dimensions

Material of the carrier tape : PS conduct

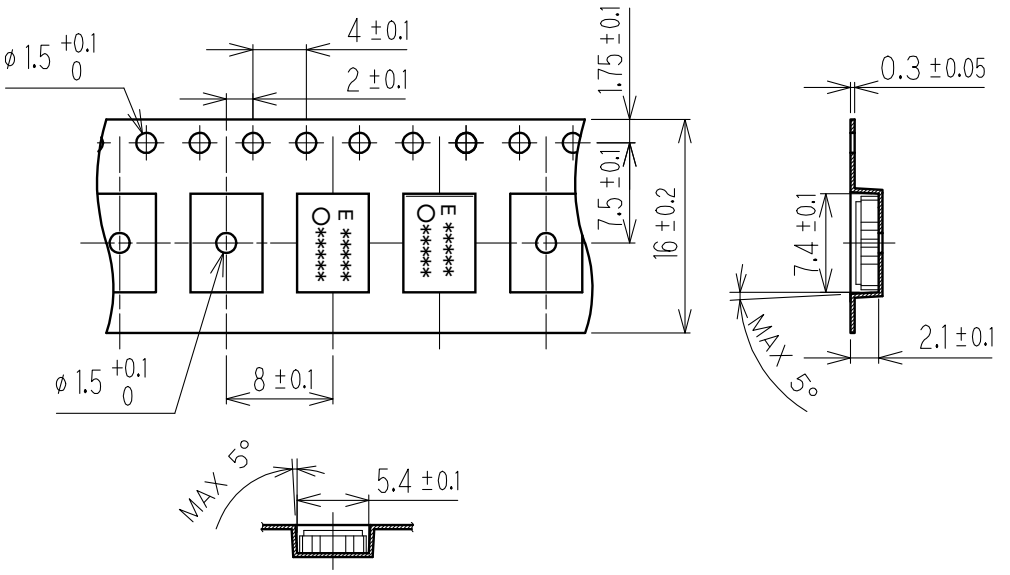
Material of the top tape : PET

(2) Reel form

Material of the reel : PS conduct

(3) Taping packing

Depends on Figure 1



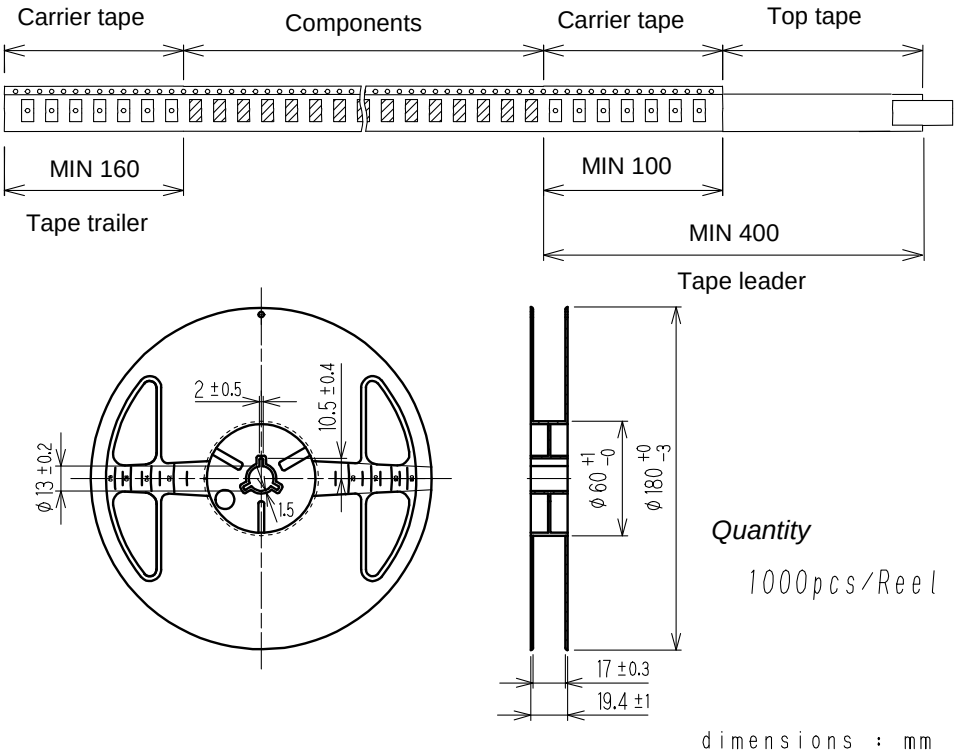


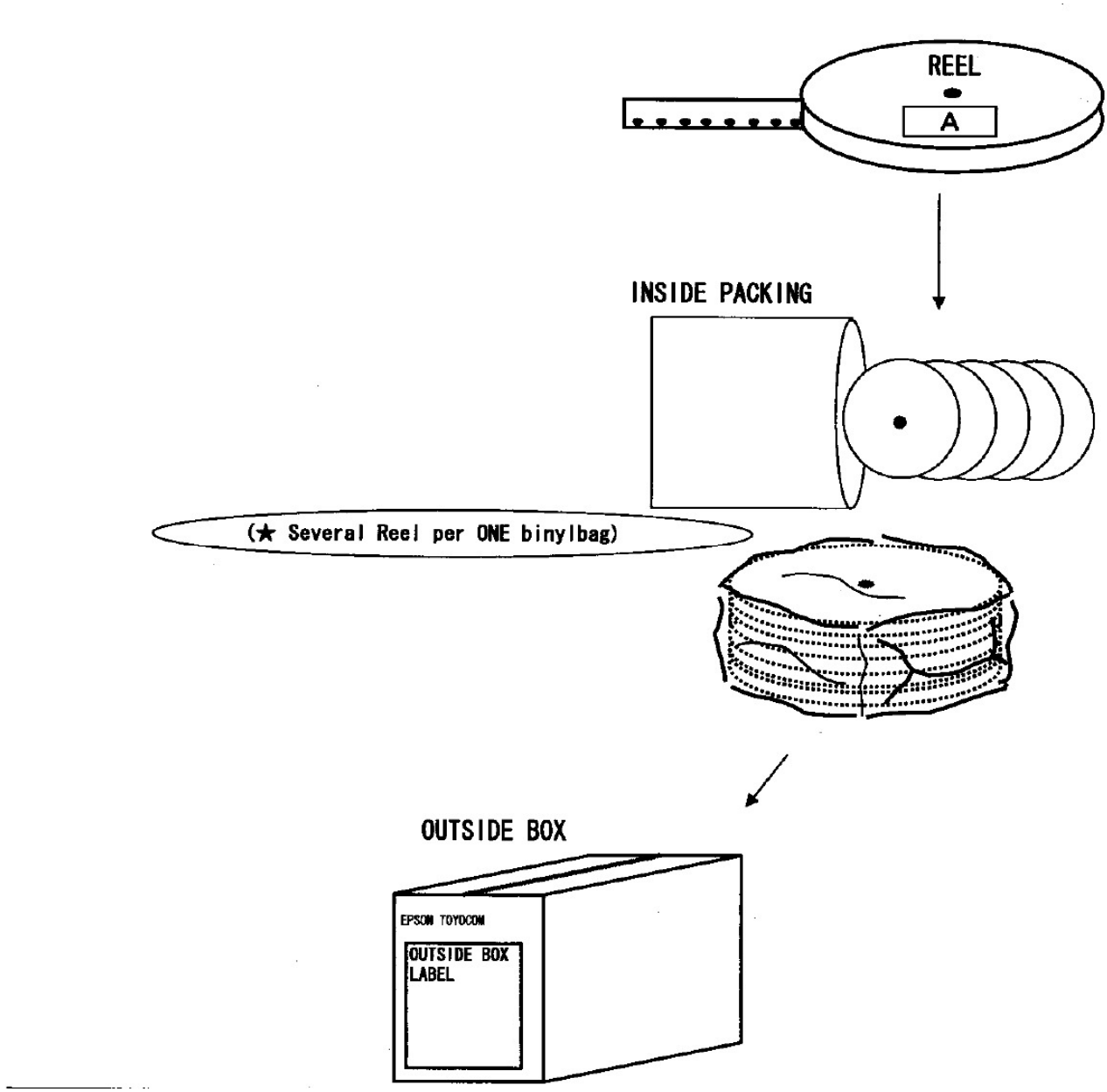
Figure 1 taping

[2] Inner carton

(1) Sticks label on to the reel.

(2) Pack reels into the antistatic bag. And seal the antistatic bag.

(3) Sticks label on the Exterior box
Box up products that are lagged with bentonite without moving. Then seal the box.



[3] Marking

1) Reel label

Label is put on the reel

Item

(1) Parts No.
(2) P/O
(3) Parts name Frequency
(4) LF(Pb free)
(5) Order No.
(6) Quantity
(7) Lot No.
(8) epsontoyocom's No.
(9) Shipment date

2) Shipping carton marking

・Shipping carton marking shall consist of :

1) Parts name
2) Quantity

[4] Quantity

・1000 pcs./reel

[5] Storage environment

(1) To storage the reel at 15℃ to 35℃, 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.

[6] Handling

(1) To handle with care to prevent the damage of tape, reel and products.
(2) Please do not have one side of the reel alone.
There is unusually a thing that comes off from an inside wick according to handling.

Reliability test results

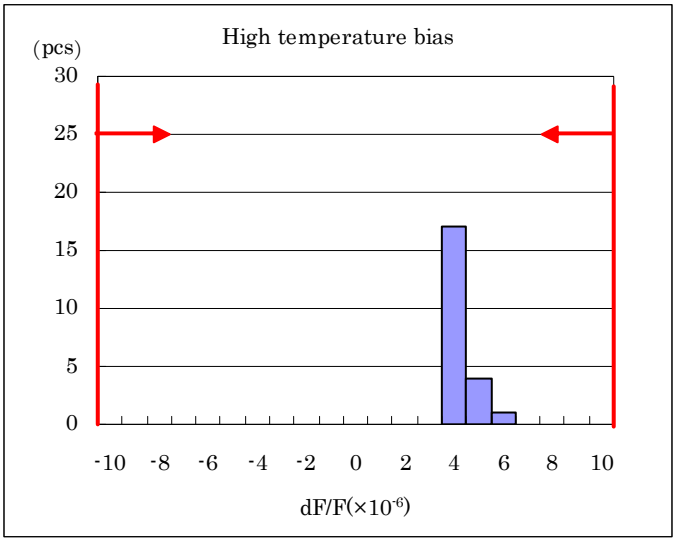
SEIKO EPSON CORPORATION
TD · CS Quality Assurance Department

Product :SG-771PCD

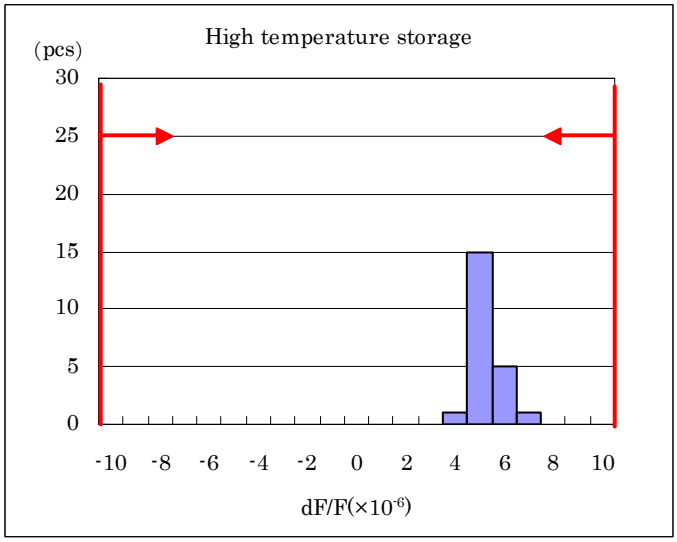
No. ST12-528

No.	Item	Test condition	Criteria dF/F [1 × 10-6]	N [pcs]	Pn [pcs]
1	High temperature bias	+85 degC, Vcc:+3.465v,1000H	± 10.0	22	0
2	High temperature storage	+125 degC,1000H	± 10.0	22	0
3	Low temperature storage	-55 degC ,1000 H	± 10.0	22	0
4	Humidity storage	+85 degC / 85%RH,1000H	± 10.0	22	0
5	Temperature cycle	-55 degC⇔+ 125 degC 30 min at each temp. 100 cycles	± 10.0	22	0
6	Resistance to soldering heat	For convention reflow soldering furnace (3 times)	± 10.0	22	0
7	Vibration	10 Hz to 85 Hz amplitude 1.5 mm 85 Hz to 2000 Hz acceleration 20G 4 h × 3 directions	± 5.0	11	0
8	Mechanical Shock	1000G 3 times × 3 directions	± 5.0	11	0
9	Drop	Free drop from 750 mm height on a hard wooden board for 9 times	± 5.0	11	0

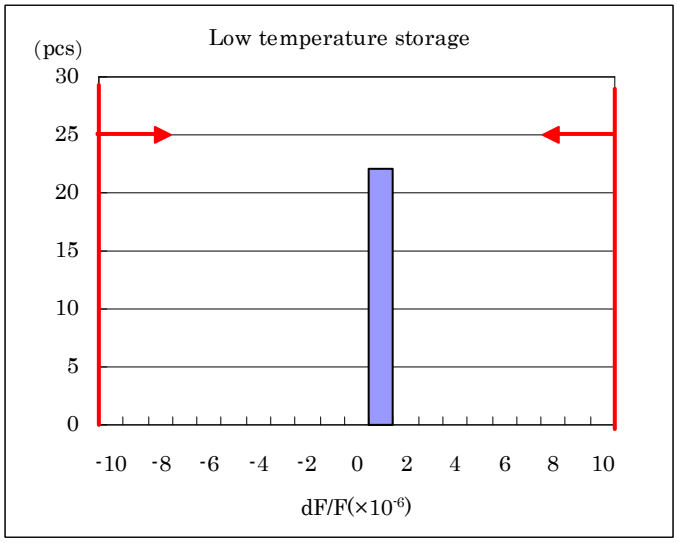
1. High temperature bias
+85 degC, Vcc:+3.465v,1000H



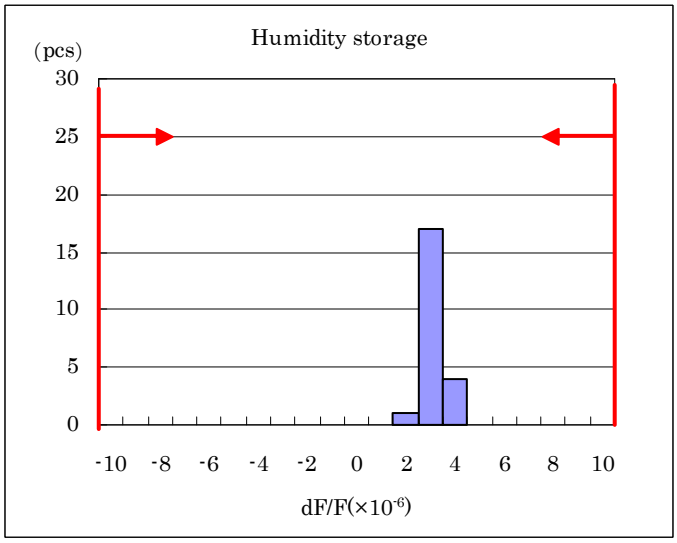
2. High temperature storage
+125 degC,1000H



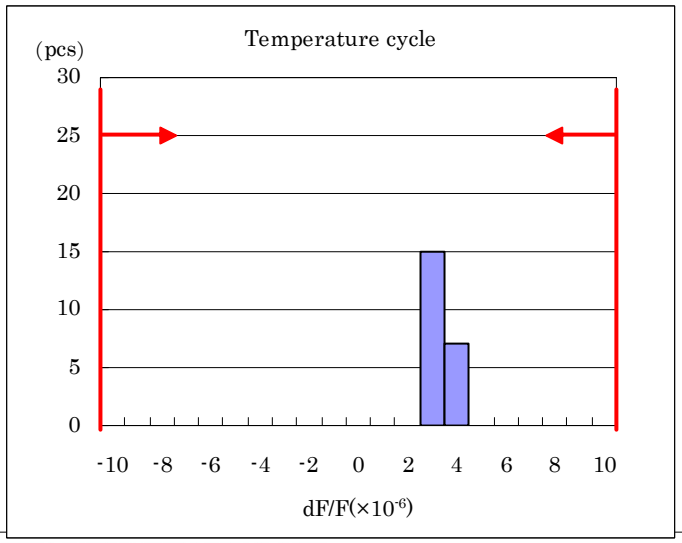
3. Low temperature storage
-55 degC,1000H



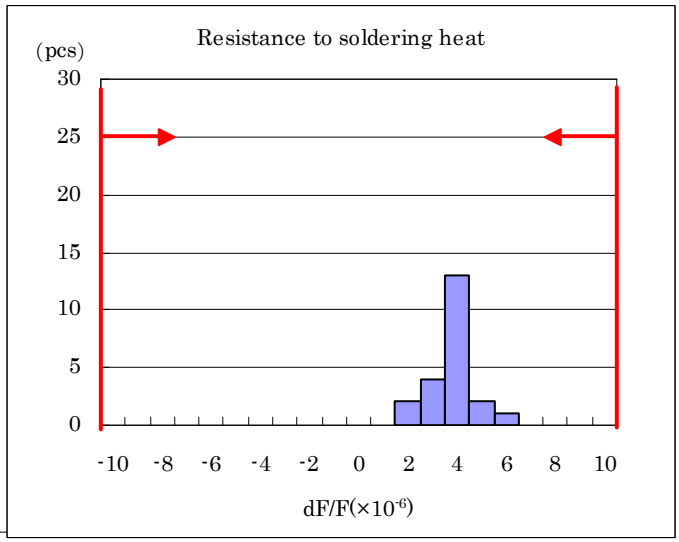
4. Humidity storage
+85 degC/85%RH,1000H



5. Temperature cycle
-55 degC⇔+ 125 degC ,30 min at each temp. 100 cycles

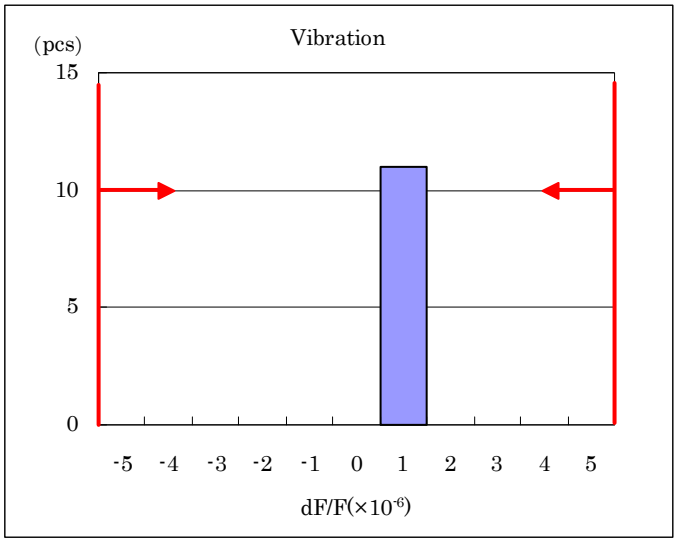


6. Resistance to soldering heat
For convention reflow soldering furnace (3 times)



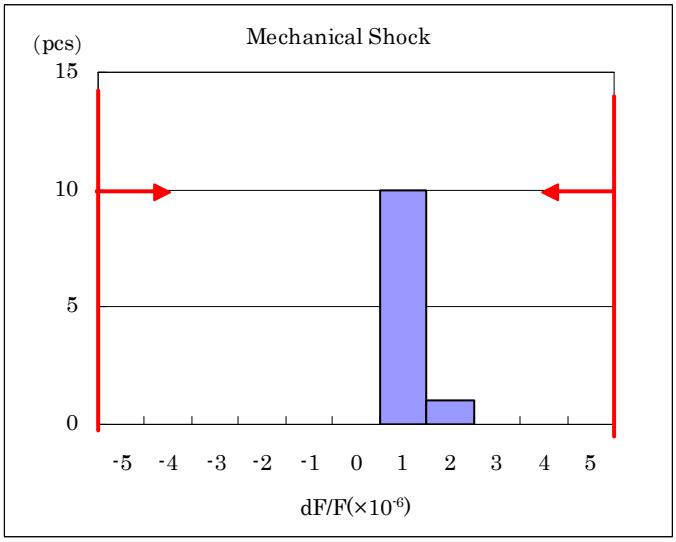
7. Vibration

10 Hz to 85 Hz amplitude 1.5 mm
85 Hz to 2000 Hz acceleration 20G
4 h × 3 directions



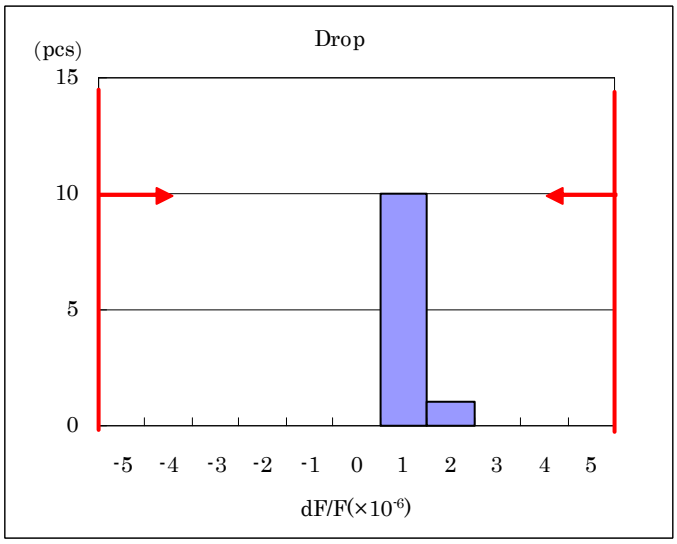
8. Mechanical Shock

1000G,3 times × 3 directions



9. Drop

Free drop from 750 mm height on a hard wooden board for 9 times



SG-771PCD PKG Process Quality Control

(QC Flow Chart)

Manufacturing Process Chart	Section In Charge	Standards	Inspection Control Item	Inspection Method	Instruments	Record
HFF Wafer						
1 **Wafer Breaking**	Production	Manufacturing Instruction Sheet	Appearance	100% Inspection	Visual	Data sheet
I **Package In-coming Inspection**	Inspection	In-coming Inspection Standard	Appearance Dimension Quantity	Sampling Inspection Sampling Inspection 100% Inspection	Visual Calipers Visual	Data sheet
II **IC In-coming Inspection**	Inspection	In-coming Inspection Standard	IC Type Quantity	100% Inspection 100% Inspection	Visual Visual	Data sheet
2-1 **Chip Parts Mounting**	Production	Manufacturing Instruction Sheet	Appearance Die shear strength	100% Inspection Sampling Inspection	Microscope Bonding tester	Data sheet
2 **HFF-Chip Mounting**	Production	Manufacturing Instruction Sheet	Appearance Die shear strength	100% Inspection Sampling Inspection	Microscope Bonding tester	Data sheet
3 **Wire Bonding**	Production	Manufacturing Instruction Sheet	Appearance Bonding strength	100% Inspection Sampling Inspection	Microscope Bonding tester	Data sheet
4 **Annealing**	Production	Manufacturing Instruction Sheet	Temperature condition	Each time	Visual	Data sheet
5 **Frequency Adjustment**	Production	Manufacturing Instruction Sheet	Frequency	100% Inspection	Frequency Counter	PC
III **Lid In-coming Inspection**	Inspection	In-coming Inspection Standard	Appearance Dimension Quantity	Sampling Inspection Sampling Inspection 100% Inspection	Visual Micrometer,Calipers Visual	Data sheet
6 **Sealing**	Production	Manufacturing Instruction Sheet	Appearance	Sampling Inspection	Microscope	Data sheet
7 **Baking**	Production	Manufacturing Instruction Sheet	Temperature condition	Each time	Visual	Data sheet
8 **Leak Inspection**	Production	Manufacturing Instruction Sheet	Leak Rate	100% Inspection	Leak detector	Data sheet
9 **Marking**	Production	Manufacturing Instruction Sheet	Appearance	100% Inspection	Visual	Data sheet

CONFIDENTIAL

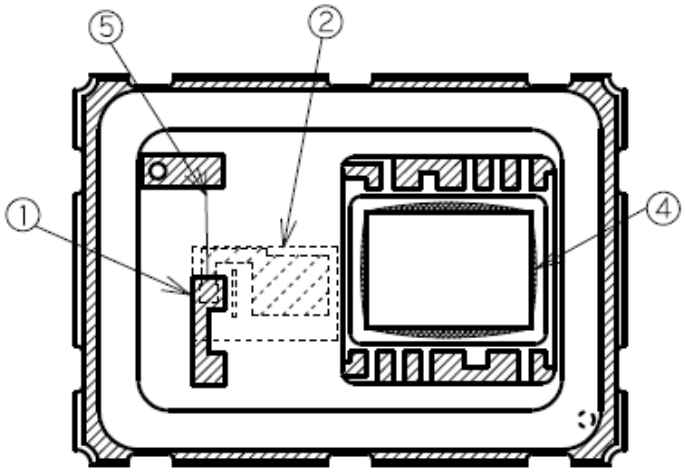
SG-771PCD PKG Process Quality Control

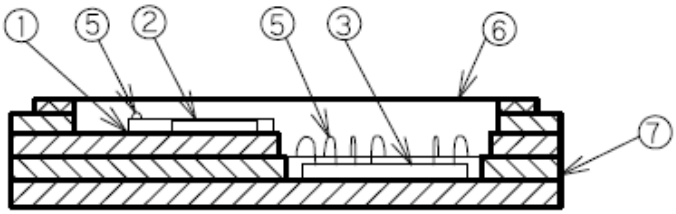
(QC Flow Chart)

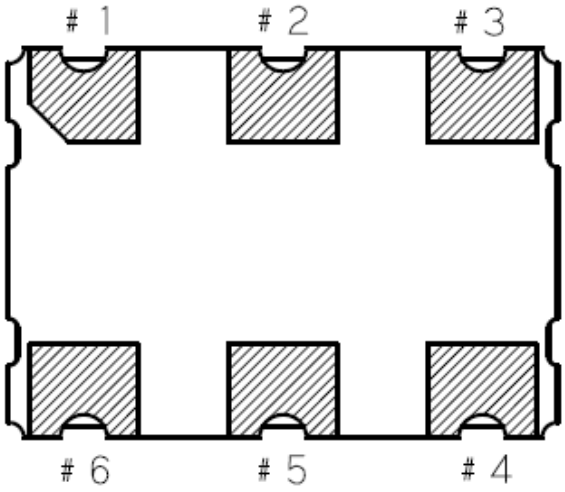
Manufacturing Process Chart	Section In Charge	Standards	Inspection Control Item	Inspection Method	Instruments	Record
⑩ **Products Inspection**	Production	Manufacturing Instruction Sheet	Appearance Electrical Characteristics	100% Inspection 100% Inspection	Visual Measuring equipment	Data sheet
⑪ **Outgoing Inspection①**	Inspection	Outgoing Inspection Sheet	Appearance Electrical Characteristics	Sampling Inspection Sampling Inspection	Visual Measuring equipment	Data sheet
⑫ **Taping**	Inspection	Outgoing Inspection Sheet	Tape Peeling Strength	Sampling Inspection	Peeling Strength Tester	Data sheet
⑬ **Outgoing Inspection②**	Inspection	Outgoing Inspection Sheet	Appearance Quantity	100% Inspection 100% Inspection	Visual Visual	Data sheet
⑭ **Packing**	Production Control	Manufacturing Instruction Sheet Daily Shipping List	Customers Type Quantity	100% Inspection 100% Inspection 100% Inspection	Visual Visual Visual	Data sheet

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Structure diagram SG-771PCD(80-175MHz)







LIST		
Name of part		Material
①	Crystal adhesive	Ag paste
②	Crystal chip	AT cut
③	IC	C-MOS
④	Chip part adhesive	Ag paste
⑤	Bonding wire	Au
⑥	Cap	Kovar
⑦	Package	Ceramic(Al_2O_2)
-	-	-
-	-	-

DWG No . 44-400324 Rev.2		
DESIGNED	CHECKD	APROVED
N.Kawabe		M.Saito