RECIPIENT

H3C Technologies Co., Limited

SPECIFICATIONS

MODEL: SG-771PCD

SPEC. No. : H09-074-0A

DATE: Nov. 20. 2009

EPSON TOYOCOM CORPORATION

65-1 Hansaki minamihara
Odaka-ku Minamisoma-shi
Fukushima-ken
979-2162 Japan

T. Kishi
A. Tokuhashi
Tadayoshi Adachi
Satoshi Sato

SPECIFICATIONS

1. Application

1) This specifications apply to Crystal oscillator SG-771PCD for H3C Technologies Co.,Limited.
2) This product is compliant with RoHS Directive.
3) This Product supplied (and any technical information furnished, if any) by Epson Toyocom 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

product No.	Model
X1G002821000900	SG-771PCD-A 156.253906MHz

3. Packing

It is subject to the packing standard of Epson Toyocom Corp.

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

Item No.	Item	Page
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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	GND-0.5 to VCC+0.5	V	
Output voltage	Vout	GND-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	—	156.253906	—	MHz		
Input voltage	VIN	0	-	VCC	V		
Operating temperature	T_use	-40		+85	°C	A	
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) ..... 156.253906 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, load variation, and 10 years aging.

[4] Electrical characteristics

(Please see page 2 [2] Operating range)

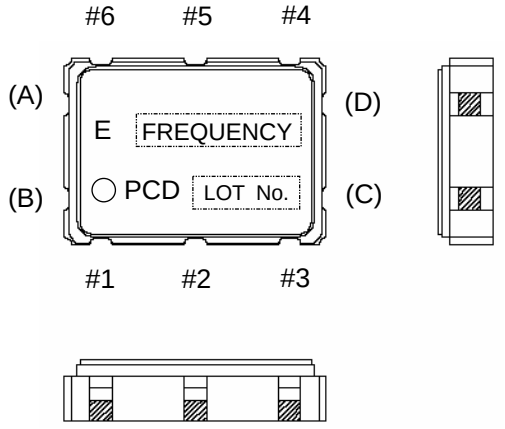
Parameter	Symbol	Value			Unit	Note
		Min.	Typ	Max		
Start up time	t_str	—	—	10	ms	
Current consumption	Icc	—	—	70	mA	OE=Vcc , RL=50Ω
Rise time *1	tr	—	—	1.5	ns	20 % to 80 % output swing
Fall time *1	tf	—	—	1.5	ns	80 % to 20 % output swing
Symmetry *1	SYM	40	—	60	%	Vcc-1.3V
High level output voltage	V_{OH}	Vcc-1.1	—	—	V	
Low level output voltage	V_{OL}	—	—	Vcc-1.5	V	

Please see [6] Test circuit.

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

*2 Please see [7] 2) OE function and timing.

[5] Terminal description

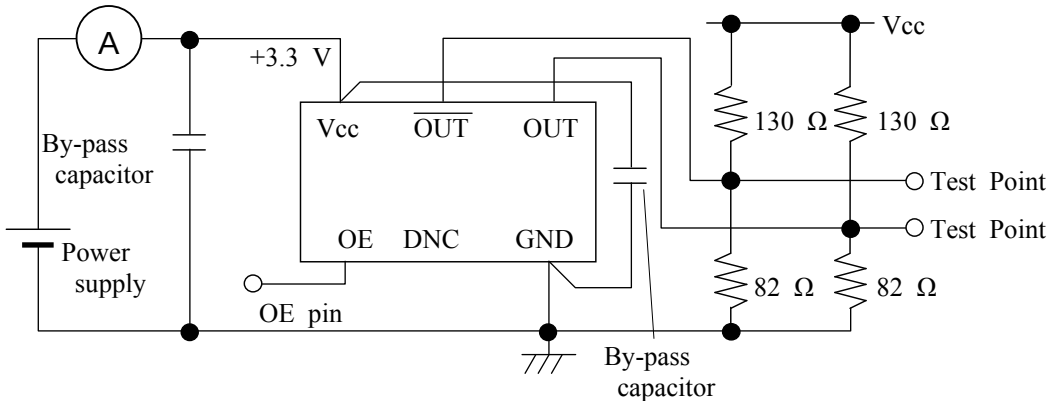


Name	No.	Type	Terminal description
OE	#1	—	OE terminal / Active High
DNC	#2	—	Please do not connect DNC(#2) of the terminal with patterns such as power supplies and GND.
GND	#3	—	GND terminal
OUT	#4	OUTPUT (Positive)	Clock out terminal
$\overline{\text{OUT}}$	#5	OUTPUT (Negative)	Clock out terminal. 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.

[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

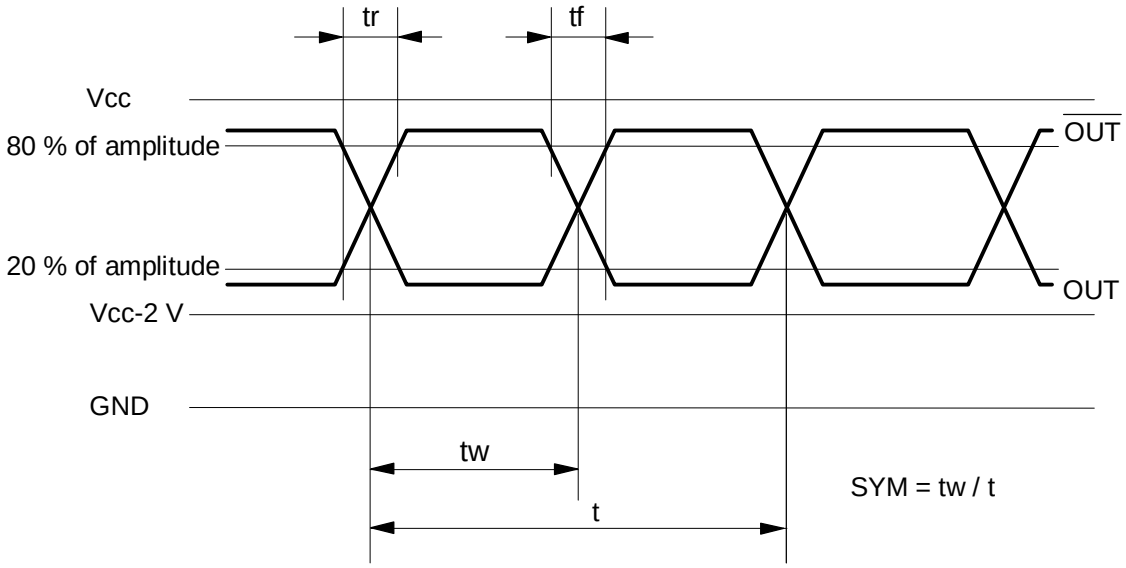
- Bandwidth should be 5 times higher than DUT's output frequency. (1 GHz)
- Probe ground should be placed closely from test point and lead length should be as short as possible.

(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.

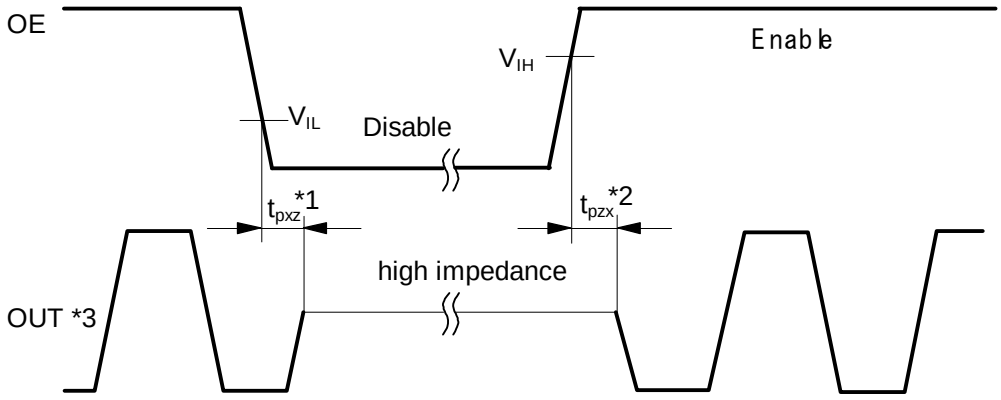
[7] Timing chart

1) Output waveform



2) OE function and timing

OE function	Osc. circuit	Output
High	Enable	Specified frequency is output : Enable
Low	Disable	Output becomes high impedance : Disable



*1 The time taken from OE=V_{IL} to output=Disable (high impedance).
*2 The time taken from OE=V_{IH} to output=Enable.

[8] Environmental and mechanical characteristics

*Epson Toyocom 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 storage *3	±10	Satisfy [5] specification after test	+85 °C × 1 000 h
2	Low temperature storage *3	±10		-40 °C × 1 000 h
3	High temp. humidity storage *3	±10		+85 °C × 85 %RH × 1000 h
4	Temperature cycle *3	±10		-55 °C ~ +125 °C 30 min. at each temp. 100 cycles
5	Resistance to soldering heat	±10		For conventional reflow soldering furnace (3 times) Ref. IPC/JEDEC J-STD-020D
6	Vibration	± 5		10 Hz to 85 Hz amplitude 1.5 mm 85 Hz to 2 000 Hz acceleration 20 G 10 Hz → 2 000 Hz → 10 Hz 20 min./cycle 12 h (4 h × 3 directions)
7	Shock	± 5		1000 G 1/2 sine wave 3 shocks in X,Y,Z (Total of 9 shocks).
8	Drop	± 5		Free drop from 750 mm height on a hard wooden board for 3 times in X,Y,Z (Total of 9 times).
9	Sealing	1 × 10^{-9} Pa·m^3/s Max.		For He leak detector

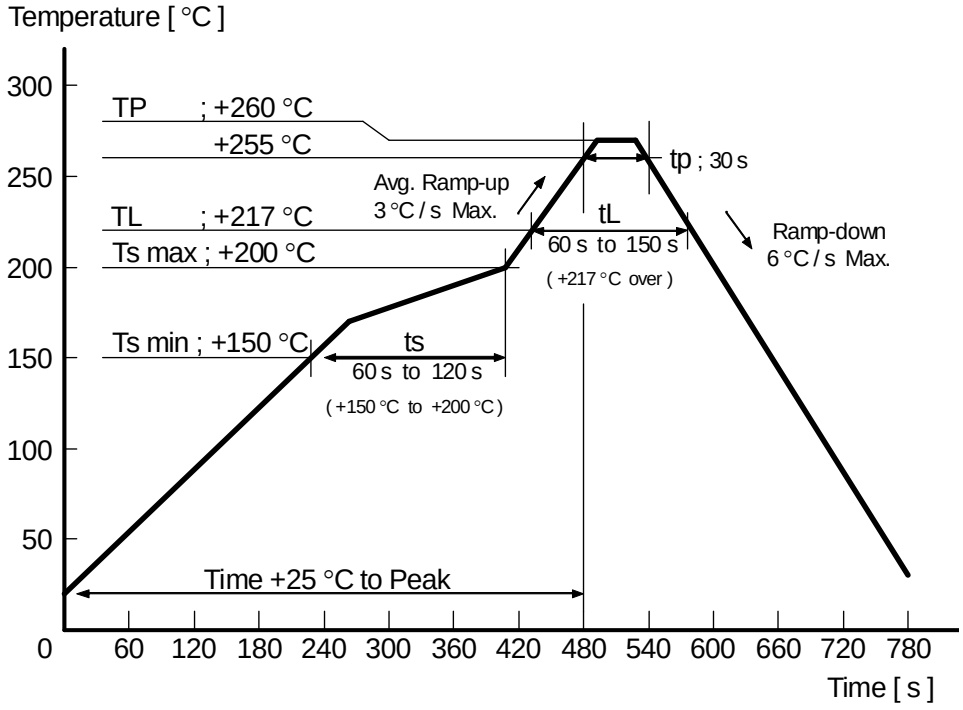
< Notes >

*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)



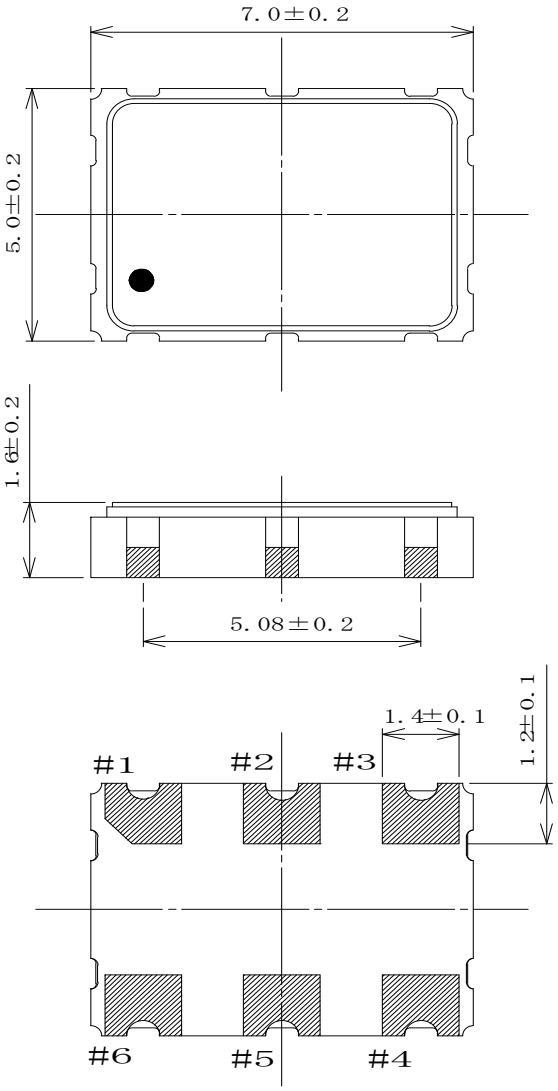
[9] Electro Static Discharge

・ESD

Item	Value	Condition
Human Body Model (HBM)	±1 000 V	Ref. IAJ ED-4701-1 C111A 100 pF, 1.5 kΩ, 3 times
Machine Model (MM)	±100 V	Ref. IAJ ED-4701-1 C111 200 pF, 0 Ω, 1 time

[10] Dimensions and marking layout

1) Dimensions



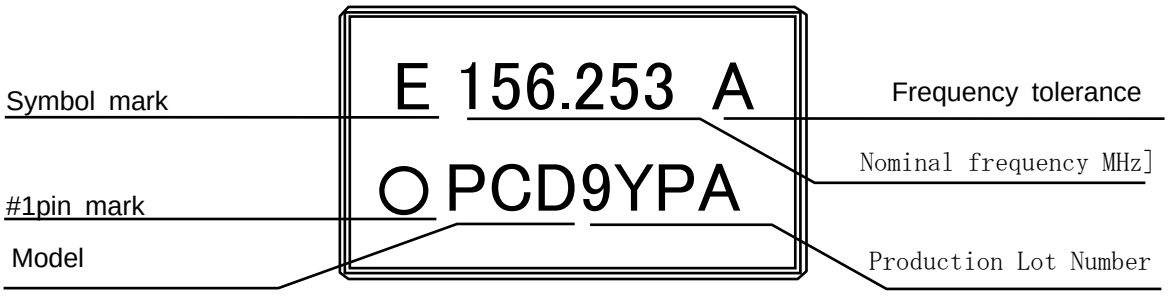
[Pin Connections]
#1: OE
#2: DNC
#3: GND
#4: Out1
#5: Out2
#6: Vcc

Please use DNC pin with no connection

[UNIT] mm

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

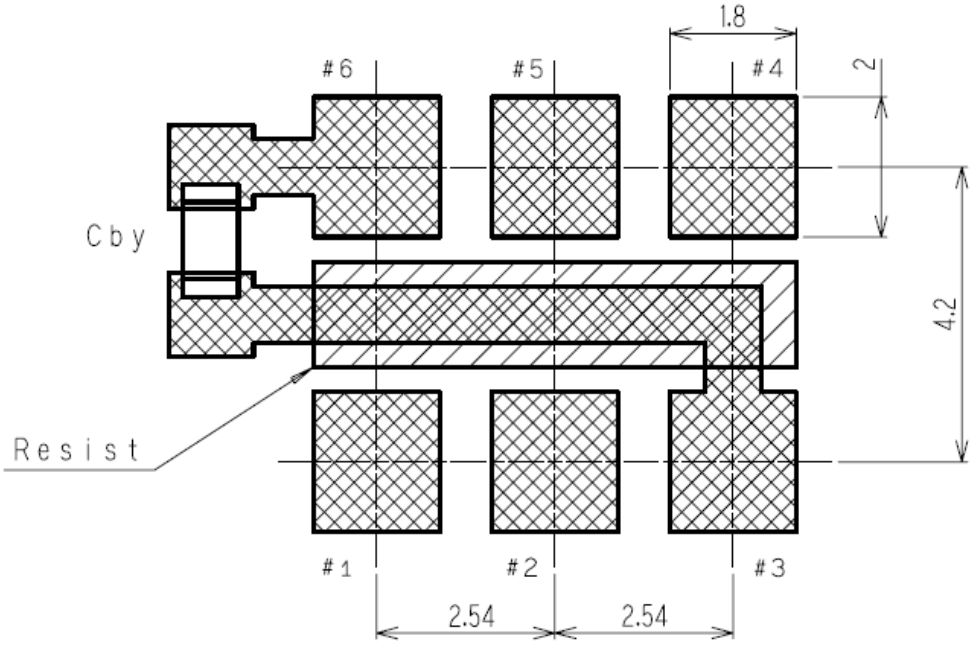
2) Marking layout



* 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)



[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 ope ration 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) EPSON TOYOCOM 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) Power ripple: 200 mV P-P max.
Start up time (0 → 90% Vcc) of power source should be more than 150 μs.
Epson 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) Please design the two output lines as short as possible.
A long output line may cause irregular output.

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

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

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

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

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

12) 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.

13) Please use DNC pin with no connection.

14) When distributing output signals, please use the clock divider IC
(Differential LV-PECL fanout buffer).

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

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

TAPING SPECIFICATION

I. Application

This document is applicable to SG-770SCD/SDD , SG-771PCD

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

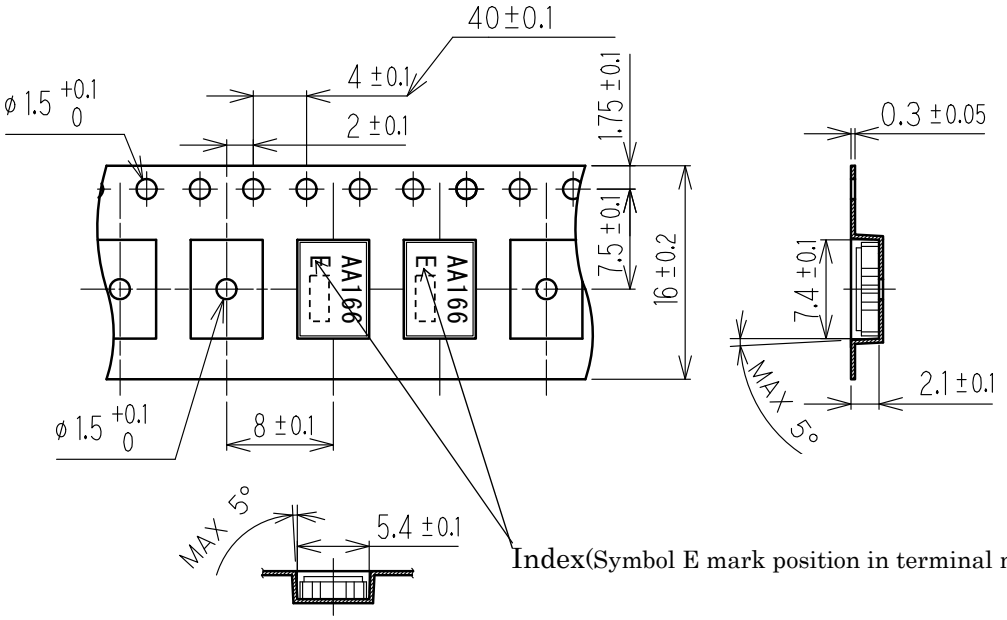
Material of the top tape : PET

(2) Reel form

Material of the reel : PS conduct

(3) Taping packing

Depends on Figure 1



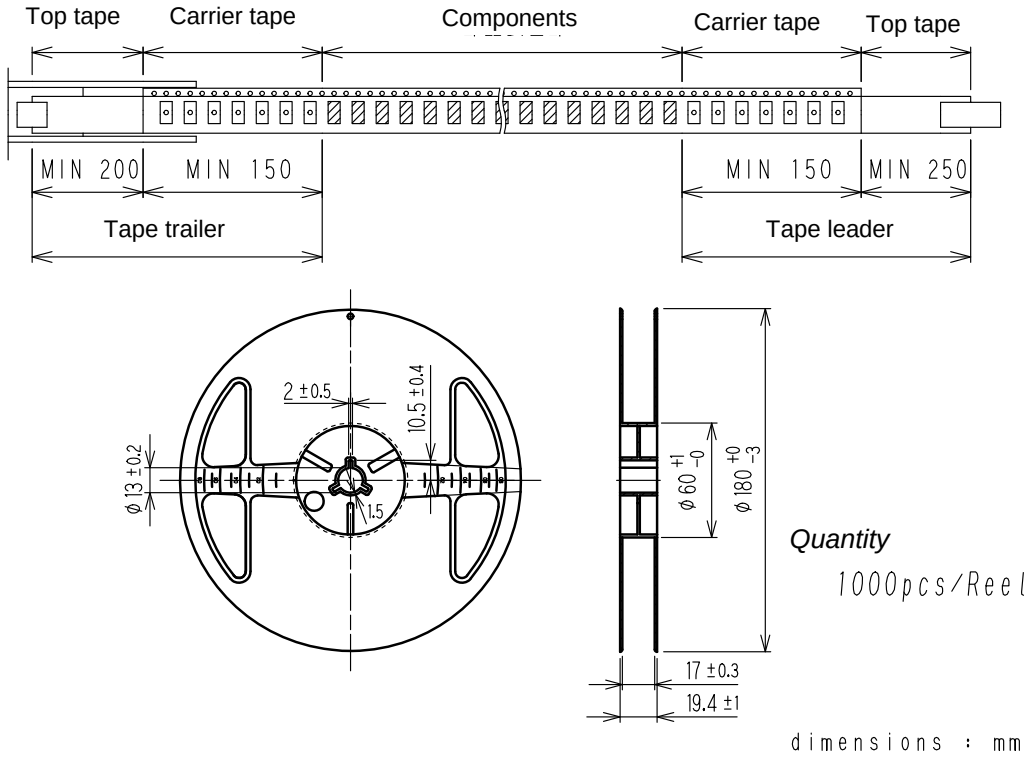


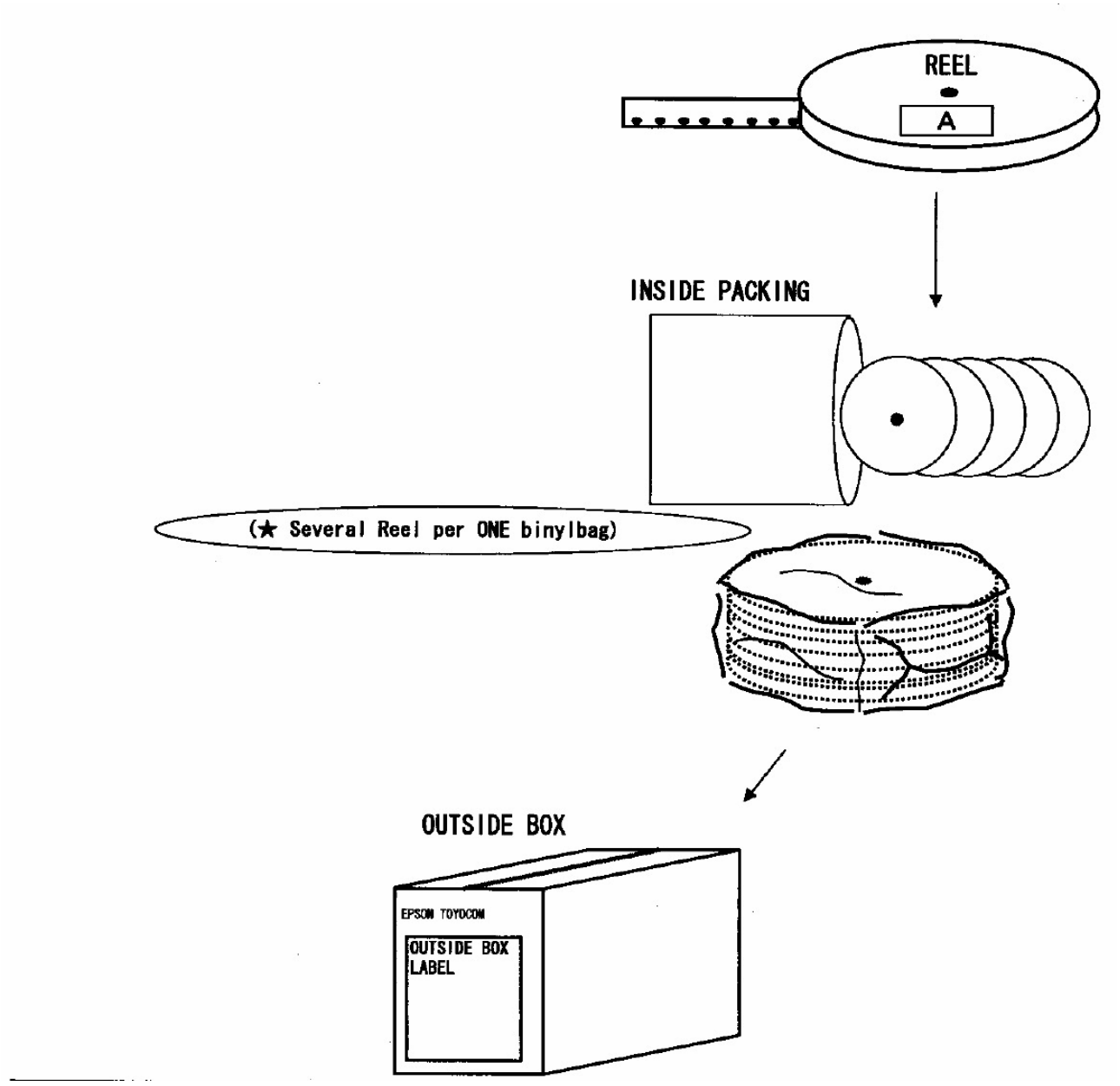
Figure 1 taping

[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

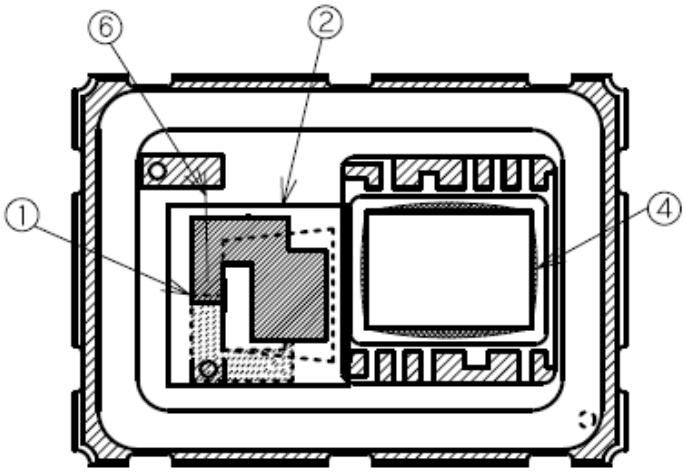
[5] Storage environment

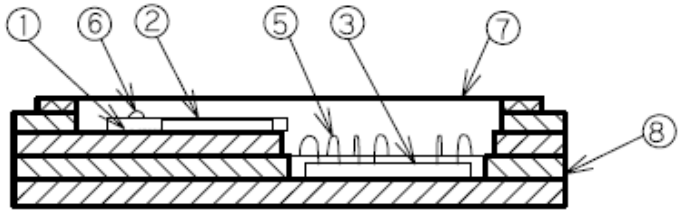
(1) To storage the reel at 15℃ to 35℃, 25%RH to 85%RH of humidity.
(2) To open the packing just before using.
(3) Not to expose the sun.
(4) Not to storage with some erosive chemicals.
(5) Nothing is allowed to put on the reel or carton to prevent mechanical damage.

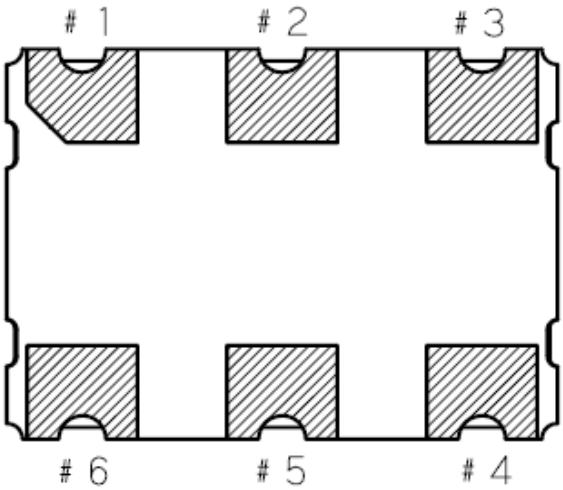
[6] Handling

(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.

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 of Chip part	Au
⑥	Bonding wire of Crystal	Al
⑦	Cap	Kovar
⑧	Package	Ceramic(Al_20_2)
-	-	-

DWG No . 44-400324		
DESIGNED	CHECKD	APROVED
N.Kawabe		N.Nomura

SG-771PCD series Reliability Test Data

Frequency : 155.52[MHz]

REP1-2A-0753

EPSON TOYOCOM CORPORATION		
APP.	CHK'D	DRAW
N. Nomura 2009.09.24		N. Kawabe 2009.09.24

Reliability Item 1/2

- ***Reflow Test***

  +260[℃] max., after 1 hour.

- ***Operating Life Test***

  +85[℃], Supply voltage : +3.47[V].

- ***Low Temperature Test***

  -40[℃].

- ***Humidity Test***

  +85[℃], 85[%RH].

- ***Heat cycle Test***

  -55[℃] ⇔ +125[℃].

Reliability Item 2/2

- ***Vibration Test***

  10Hz to 2000Hz 1.5mm amplitude or 20G.
  Vibrate in 3 mutually perpendicular planes each 4 hours.

- ***Mechanical Shock Test***

  1000G, 3000G, 5000G
  3 times / direction ✕ 3directions

- ***Drop Test***

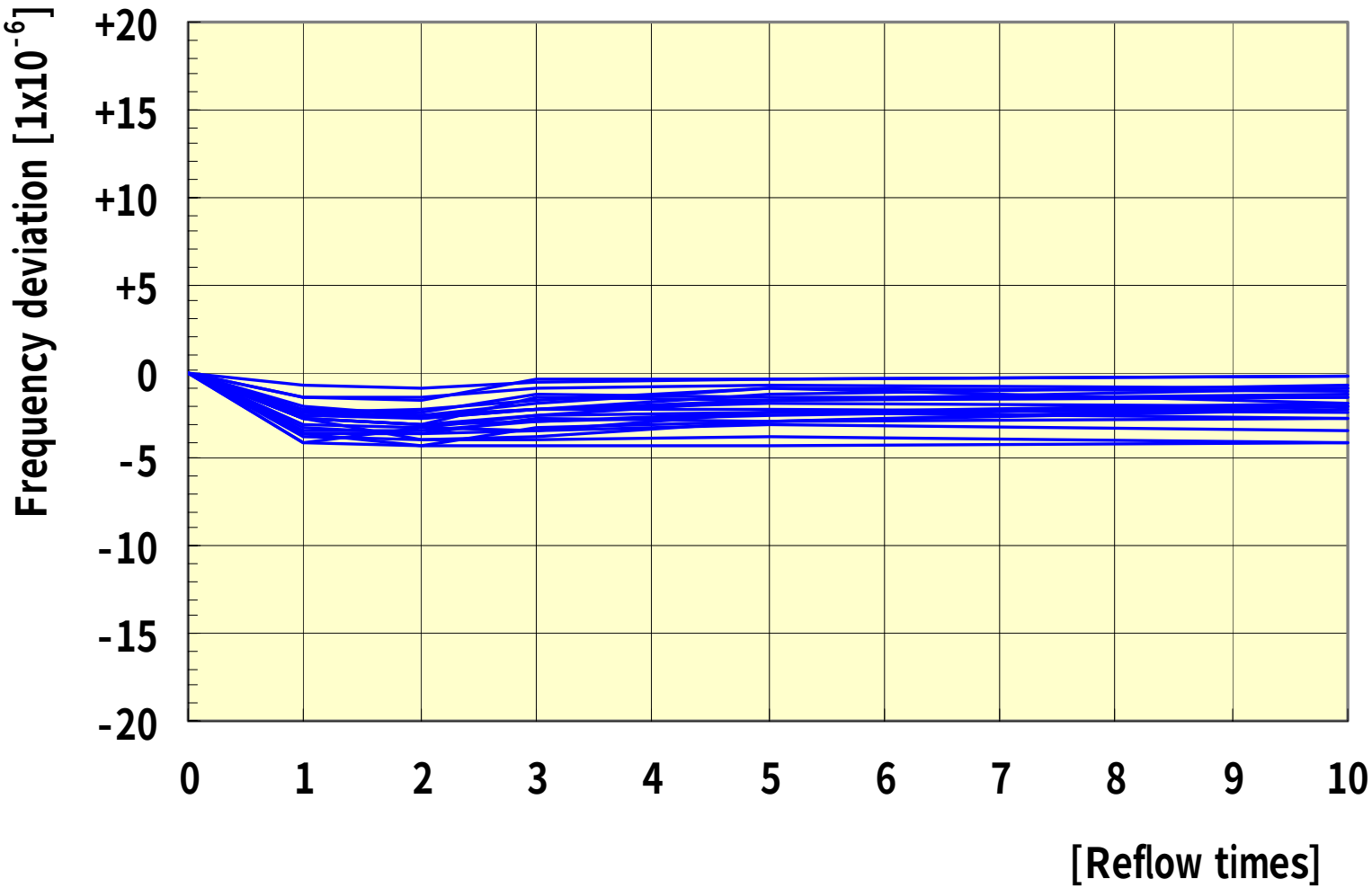
  On to wood plate from 750mm height
  1cycle=6 directions.

- ***ESD Test***

  Human model / Machine model

Reflow Test

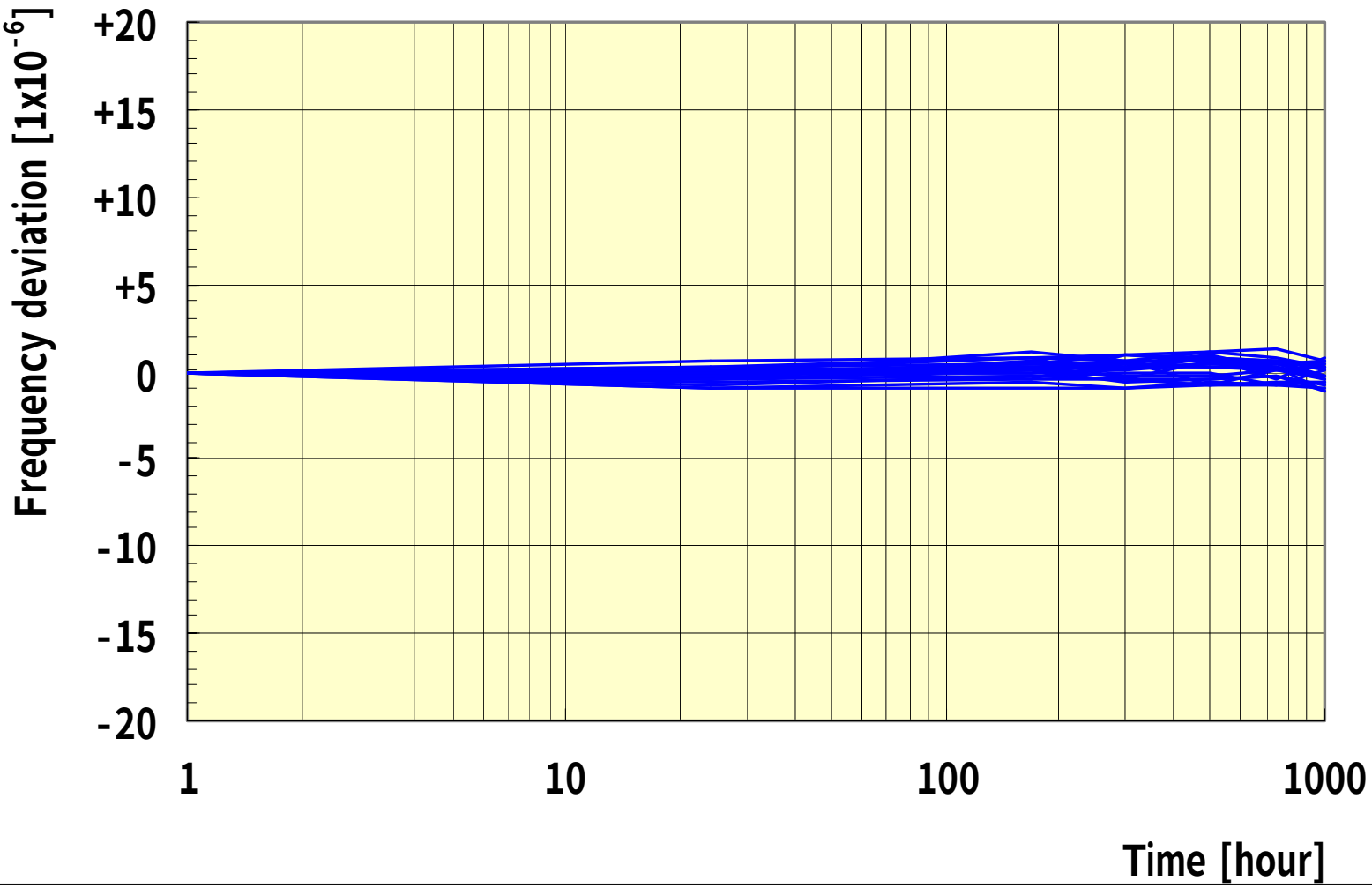
Condition : +260[℃] max., after 1 hour.
Sample:22pcs.



Operating Life Test

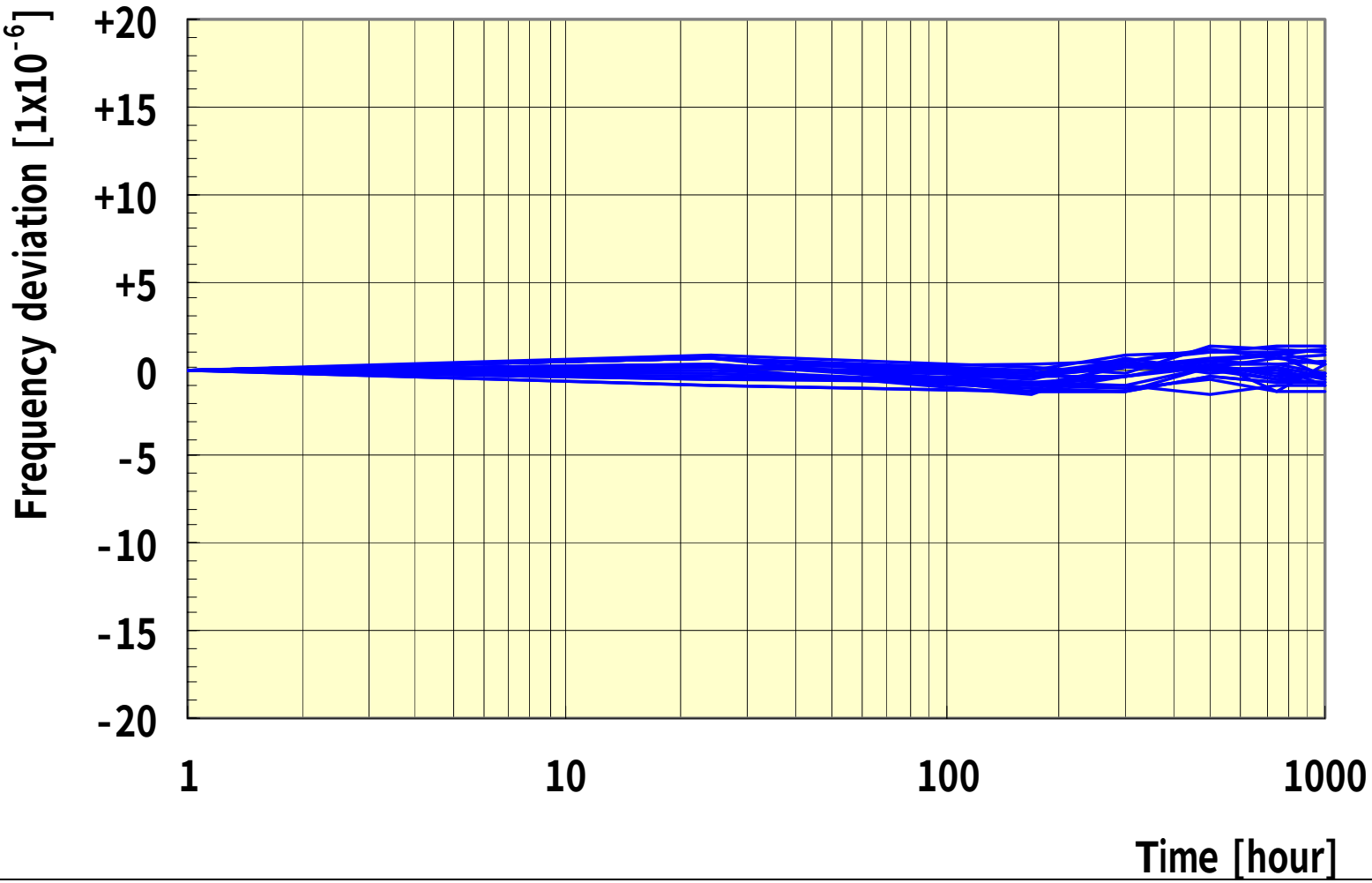
EPSON TOYOCOM

Condition : +85[℃], Supply and Control voltage : +3.47[V].
Sample:22pcs.



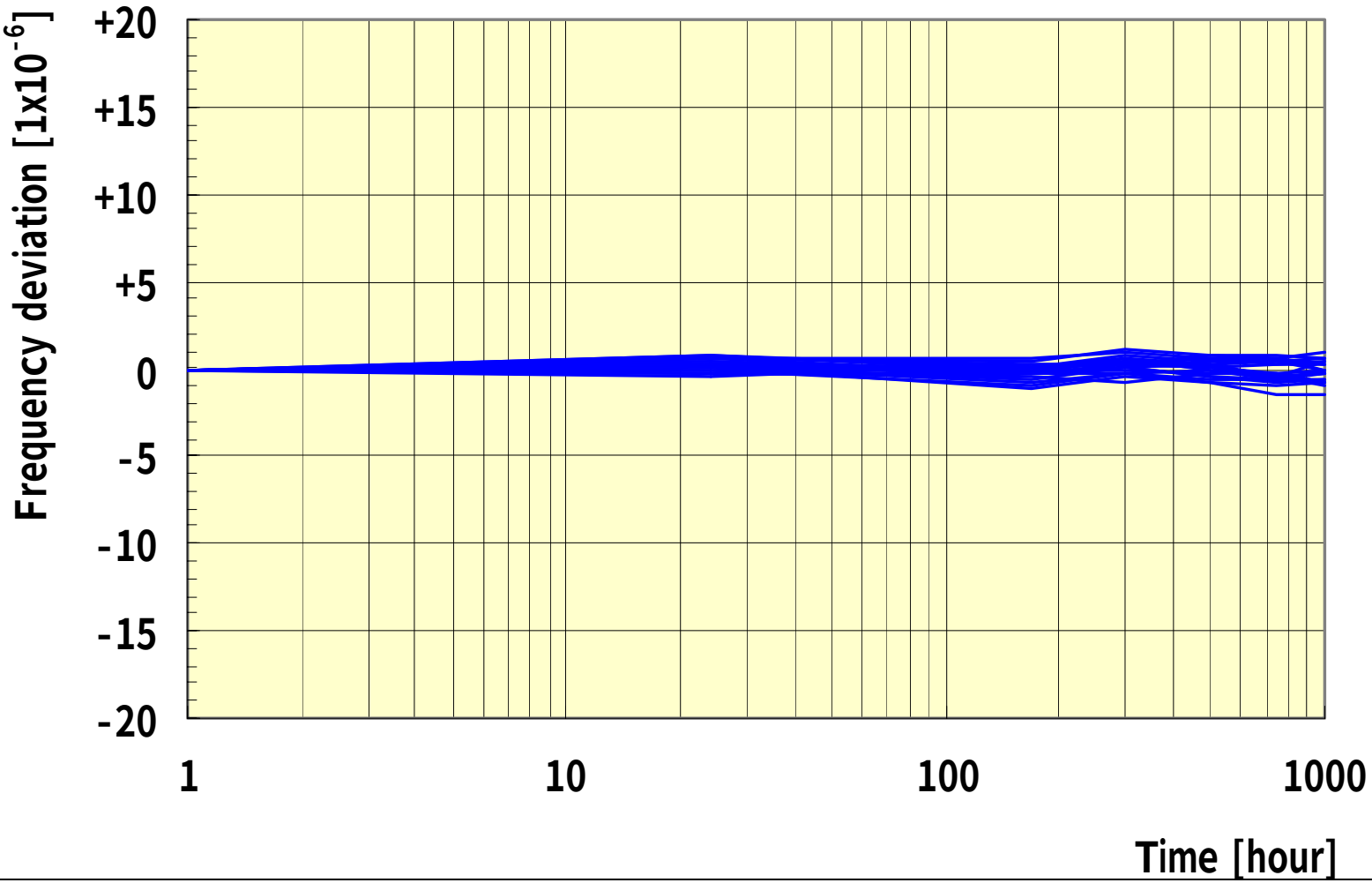
Low Temperature Test

Condition : -40[℃].
Sample:22pcs.



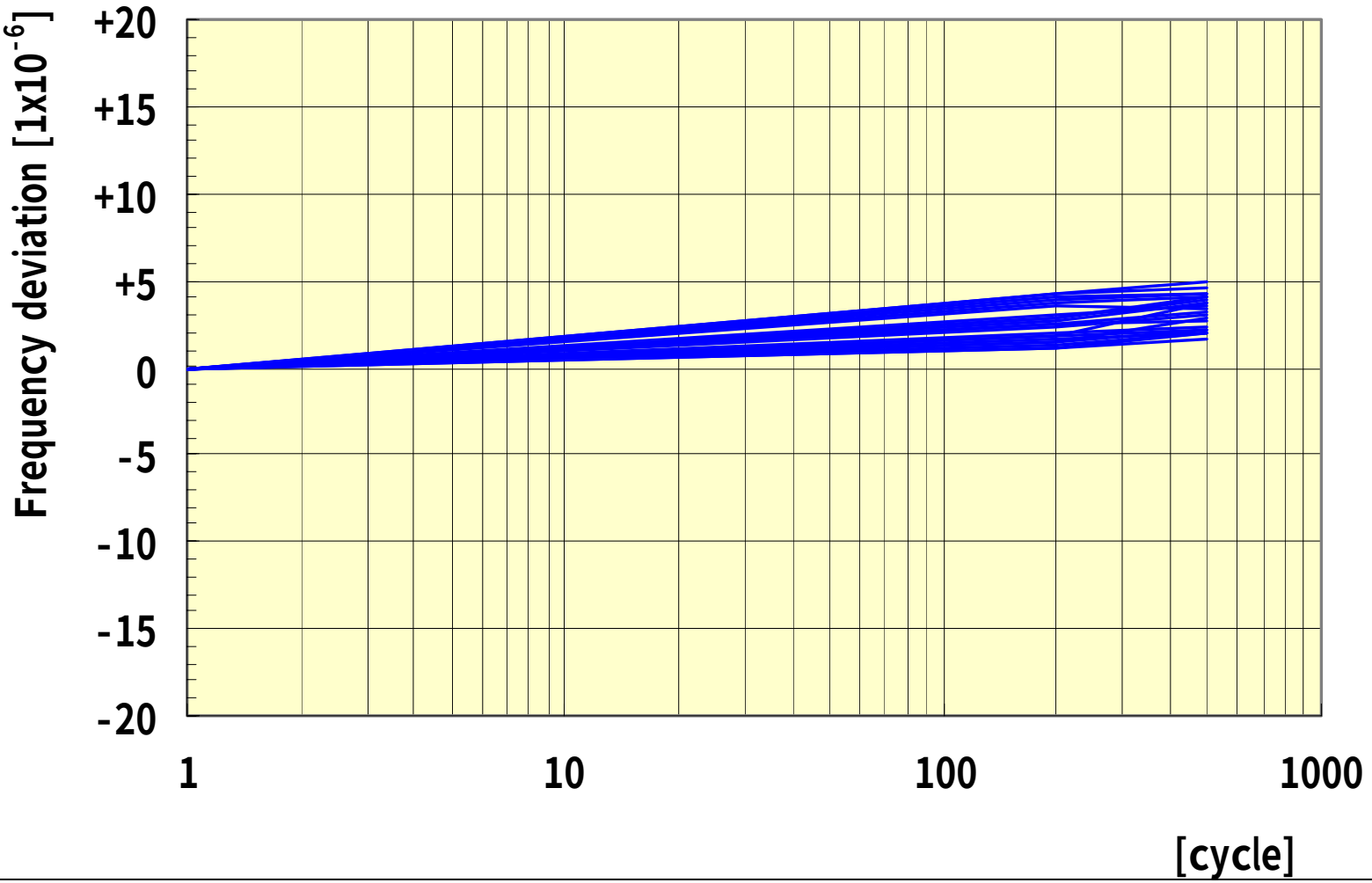
Humidity Test

Condition : +85[℃], 85[%RH].
Sample:22pcs.



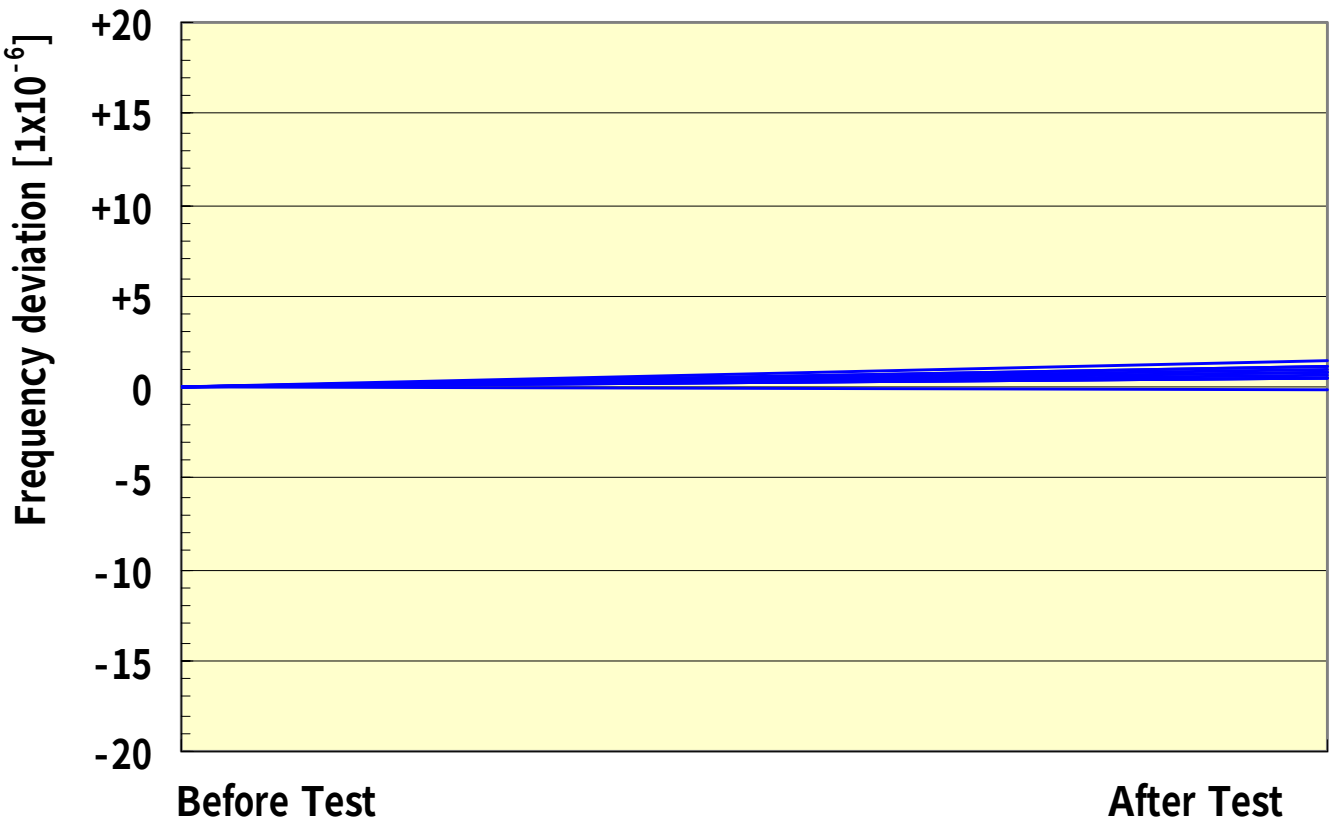
Heat cycle Test

Condition : -55[℃] ⇔ +125[℃].
Sample:22pcs.



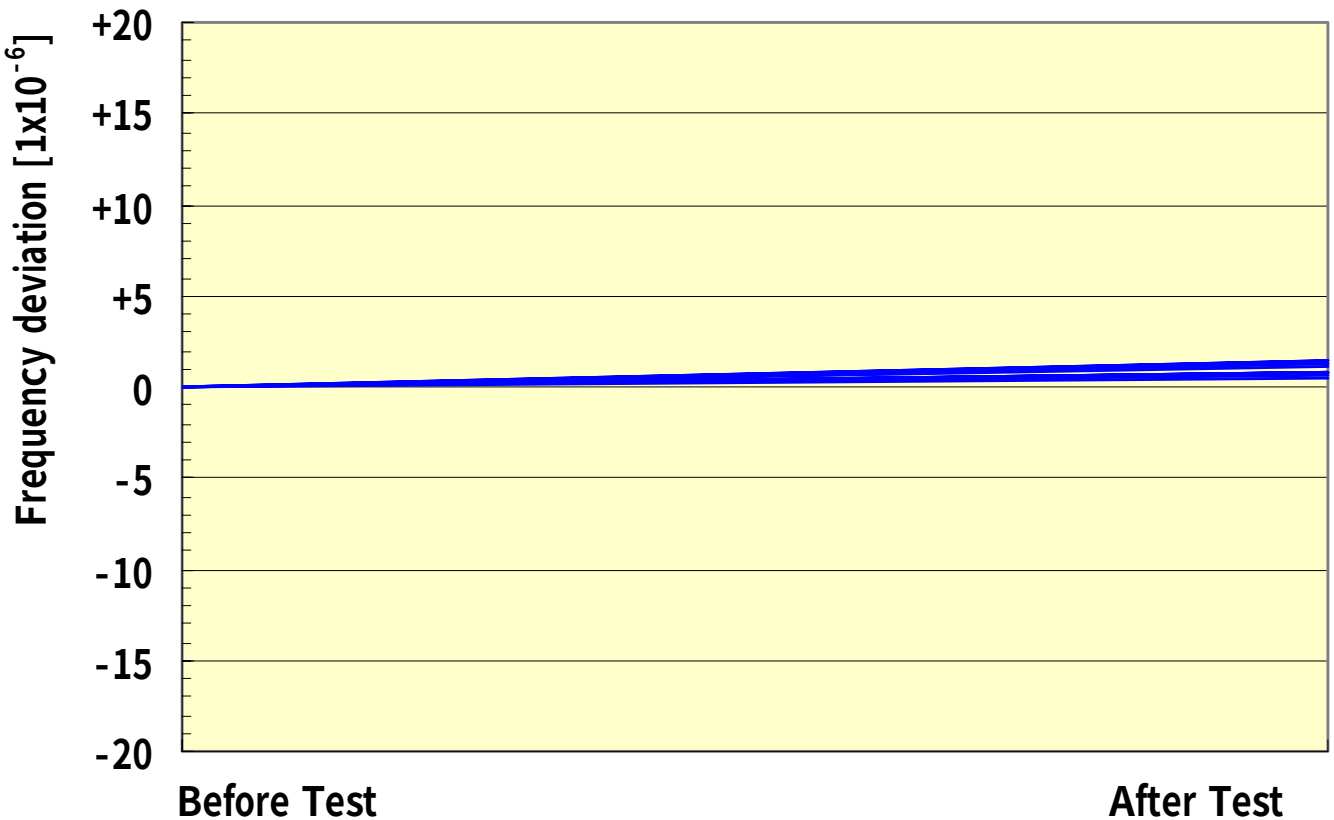
Vibration Test

Condition : 10Hz to 2000Hz 1.5mm amplitude or 20G.
Vibrate in 3 mutually perpendicular planes each 4 hours.
Sample:11pcs.



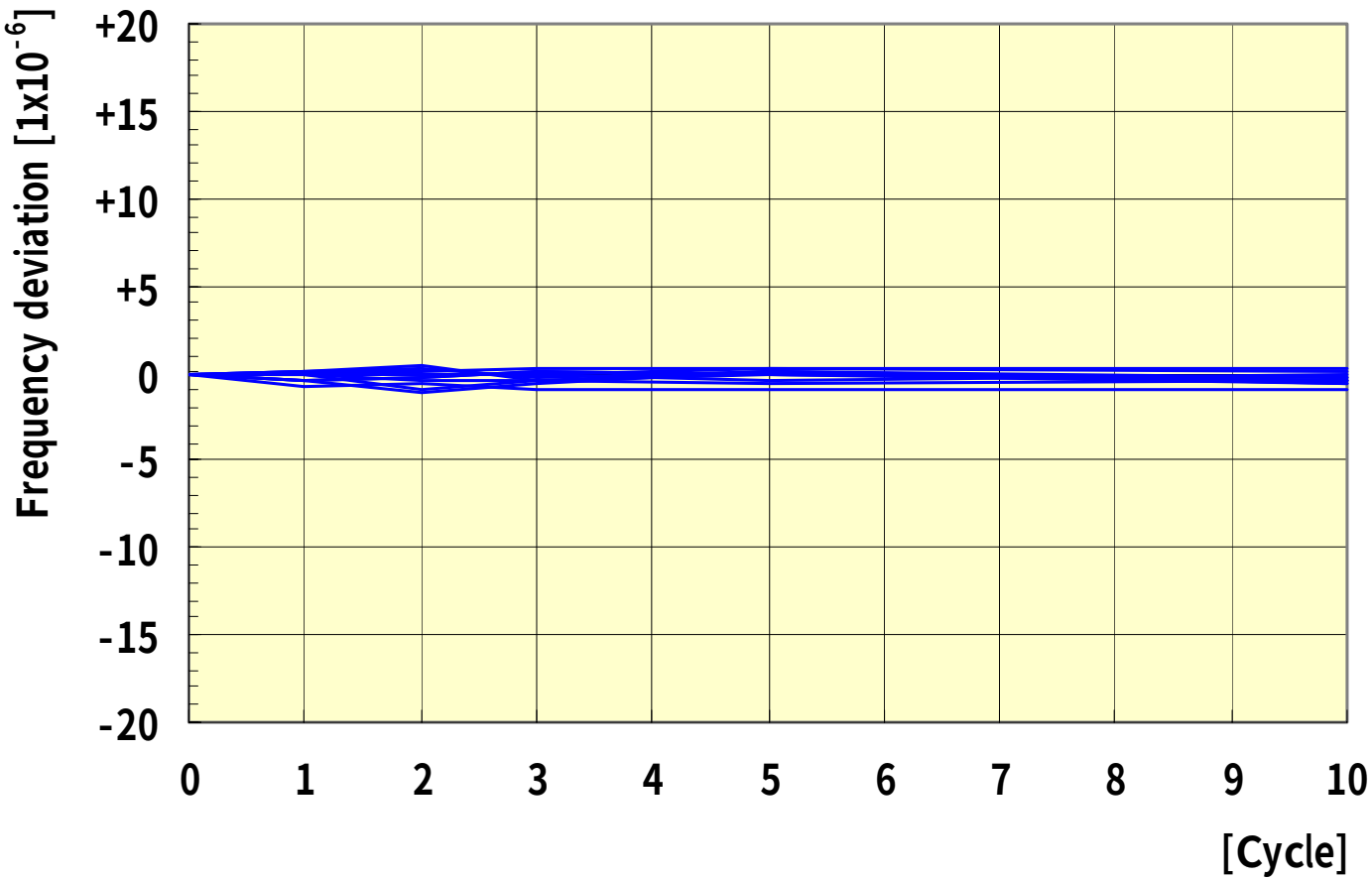
Mechanical Shock Test

Condition : On to wood plate from 750mm height.
1cycle=6 directions.
Sample:11pcs.



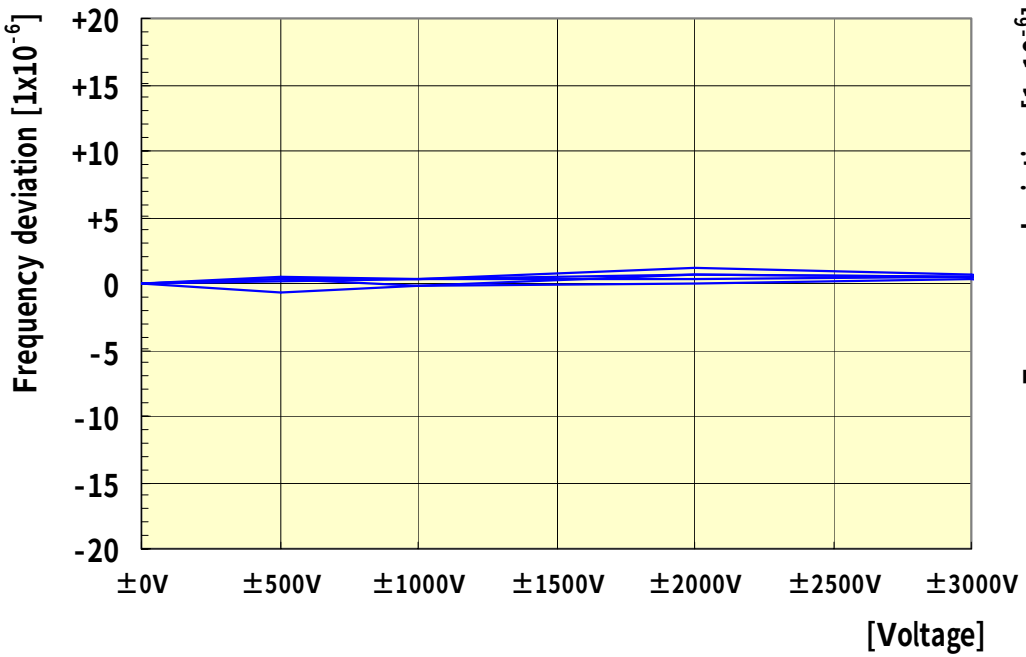
Drop Test

Condition : On to wood plate from 750mm height.
1cycle=6 directions.
Sample:11pcs.



Condition : Human model / Machine model
Sample:5pcs. (each)

Human model



Machine model

