



REFERENCE SPECIFICATION

Customer: _____

Item:	CRYSTAL UNIT
Type:	NX2012SA
Nominal Frequency:	32.768kHz
Customer's Spec. No.:	---
NDK Spec. No.:	EXS00A-MU00644

For your reference we submit this specification.
Please study and keep in your related document file.

Charge:

Sales		
Engineer		

Revision Record						

1. Customer's Spec. No. : ---
2. NDK Spec. No. : EXS00A-MU00644
3. Type : NX2012SA
4. Electrical Specifications

	Parameters	SYM.	Electrical Spec.				Notes
			MIN	TYP	MAX	UNITS	
4.1	Nominal Frequency	F _{nom}	32.768			kHz	-
4.2	Overtone Order	-	Fundamental			-	-
4.3	Load Capacitance	CL	12.5			pF	Network Analyzer (CNA-LF made in Transat corp.)
4.4	Frequency Tolerance	-	+/-20			ppm	at +25 +/-3°C ,Not include aging
4.5	Turning Point	-	+25 +/-5			°C	-
4.6	Temperature coefficient	-	-	-	-0.04	ppm/ °C ²	-
4.7	Operating Temperature range	-	-40	~	+85	°C	-
4.8	Aging	-	+/-3			ppm	1 st year (at +25°C)
4.9	Drive level	DL	-	0.1	1.0	uW	-
4.10	Equivalent Resistance	R _r	-	-	80	kΩ	Network Analyzer (CNA-LF made in Transat corp.)
4.11	Shunt Capacitance	C ₀	0.9	1.2	1.5	pF	Network Analyzer (CNA-LF made in Transat corp.)
4.12	Insulation Resistance	-	500	-	-	MΩ	Terminal to terminal insulation resistance also terminal to cover insulation resistance must be500MΩ (Min.) when DC100V ±15V is applied.
4.13	Storage Temperature range	-	-40	~	+85	°C	-
4.14	Motional Capacitance	C ₁	3.0	5.0	7.0	fF	Network Analyzer (CNA-LF made in Transat corp.)

5. Examination results document

Since a performance is guaranteed, an examination results document does not submit.

6. Application drawing

- 6.1 Dimension drawing : EXD14B-00387
- 6.2 Taping and reel figure : EXK17B-00273
- 6.3 Holder marking : EXH11B-00366
- 6.4 Reel Packing : EEK17B-00015
- 6.5 Reliability assurance Item : EXS30B-00845

7. Notice

- 7.1 Order items are manufactured according to specification. As to conditions, which are not indicated in this specification and unpredictable such as applied condition and oscillation margin, please check them beforehand.
- 7.2 Unless we receive request for modification within 3 weeks from the issue date of this NDK specification sheet, we will supply products according to this specification. Also, if you'd like to modify specification of order, which has been placed with delivery request within 3 weeks from the issue data of this specification sheet, we would like to discuss with you separately.
- 7.3 In no event shall the company be liable for any product failure resulting from an inappropriate handling or operation of the product beyond the scope of its guarantee.
- 7.4 Where any change to the process condition is made due to the change(s) in the production line, inform personnel of the specifications.
- 7.5 Should this specification data give rise to any disputes relating to any intellectual property rights or any other rights of a third person, the company shall not indemnify anyone for any damage. Their disclosure must not be construed as the grant of a license to use any of the intellectual property rights owned by the company.
- 7.6 If you intend to use products listed on this specification for applications that may result in loss of life or assets (controls relating to safety, medical equipment, aeronautical equipment, space equipment, etc.), please do not fail to advise us of your intention beforehand.
- 7.7 In the company's production process whatever amount of ozone depleting substances (ODS) as specified in the Montreal protocol is not used.
- 7.8 Information contained in this specification must not be quoted, reproduced or used for other purposes including processing either in part or in full without obtaining prior approval from the company.
- 7.9 The appearance color and so on have a different case by purchasing it more than 2 suppliers of the component, but characteristic and reliability are guaranteed.
- 7.10 Crystal units will be damaged by ultrasonic welding process due to resonance of crystal wafer itself. NDK does not recommend using ultrasonic welding. If Ultra Sonic welding used, NDK strongly recommend verifying crystal unit damage by ultrasonic weld.

8. Prohibited items

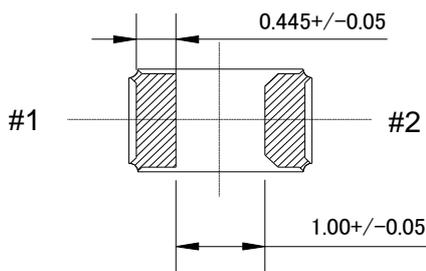
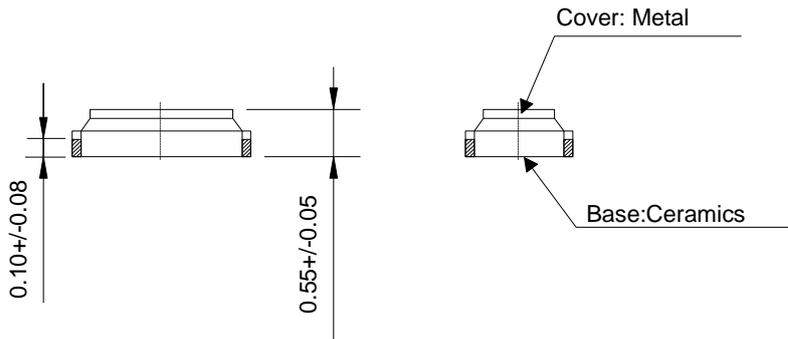
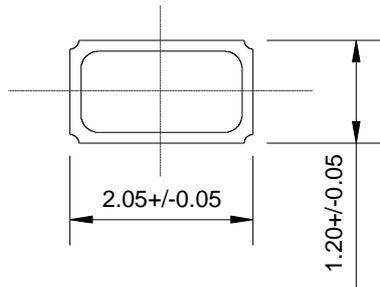
Be sure to use the product under the following conditions. Otherwise, the characteristics deterioration or destruction of the product may result.

(1)Reflow soldering heat resistance

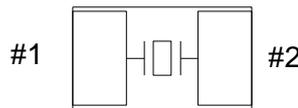
Peak temperature	: 265°C, 10 sec
Heating	: 230°C or higher, 30 sec
Preheating	: 150°C to 180°C, 120 sec
Reflow passage times	: twice

(2)Manual soldering heat resistance

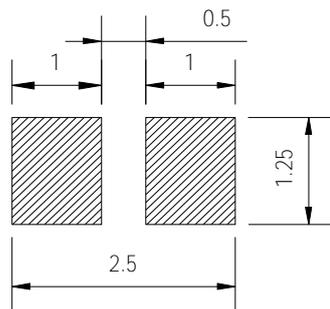
Pressing a soldering iron of 400°C on the terminal electrode for four seconds (twice) .



INTERNAL CONNECTION (TOPVIEW)

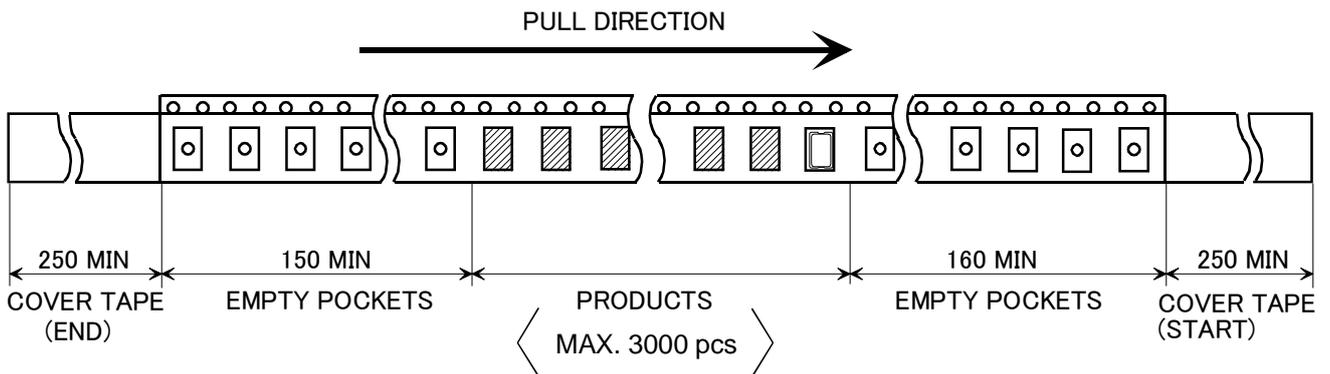
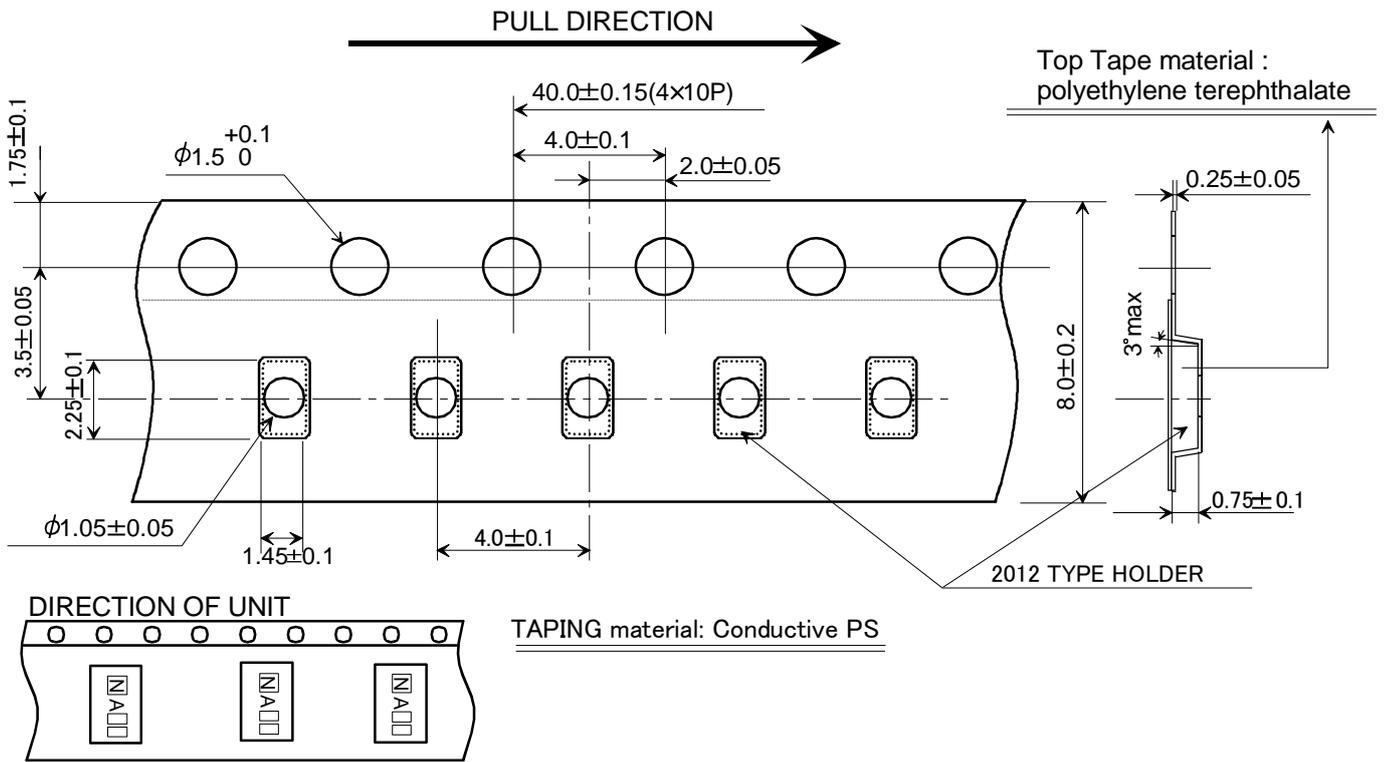


Recommended soldering pattern



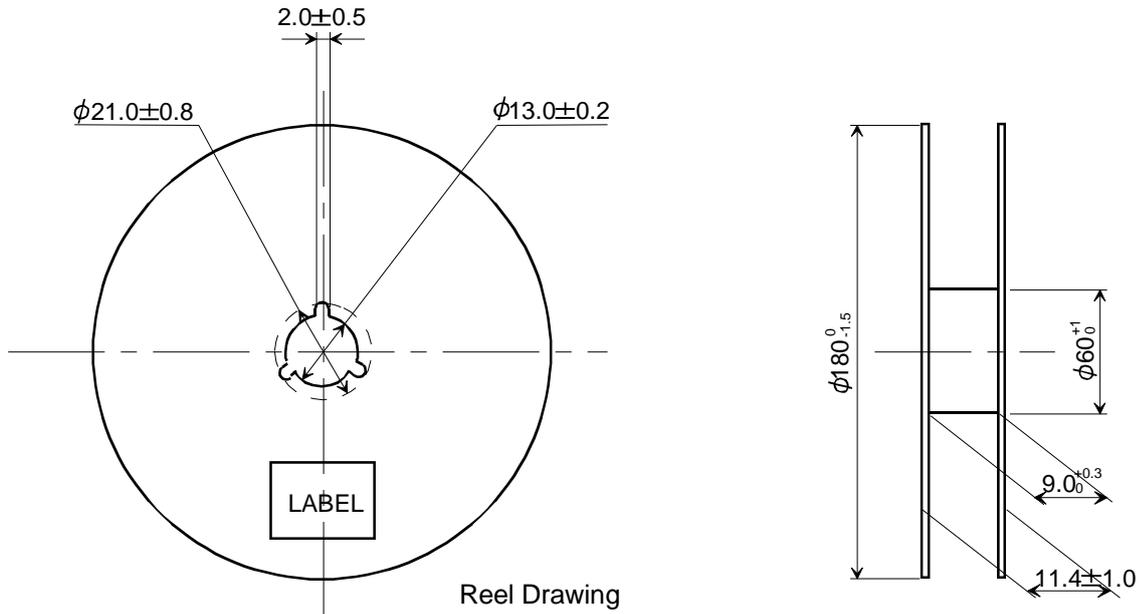
	Date of Revise	Charge	Approved	Reason		
D	3.Jul.2012	Y.Hasuike	H.Matsudo	Addeed Castellation		
	Date	Name	Third Angle Projection	Tolerance		
Drawn	17.July.2007	S.Kawanishi	Dimension:mm	± 0.2		
Designed	17.July.2007	S.Kawanishi	Title NX2012SA External Dimension			
Checked	17.July.2007	M.Yoshimatsu			Drawing No. EXD14B-00387	
Approved	17.July.2007	K.Ono				

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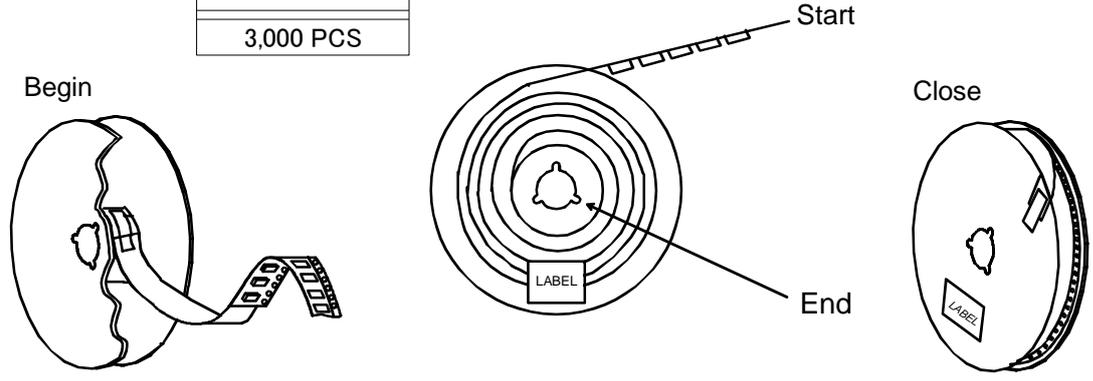
	Date of Revise	Charge	Approved	Reason	
C	3 Aug.2012	Y.Hasuike	H.matsudo	Added of quantity	
	Date	Name	Third Angle Projection	Tolerance	
Drawn	31.Jul.2007	K.Oguri	Dimension:mm	Scale	
Designed	31.Jul.2007	S. Kawanishi	2012 TYPE Taping and Reel Spec.	Drawing No. EXK17B-00273 1/2	
Checked	-----	-----			Rev.
Approved	31.Jul.2007	K. Ono			C

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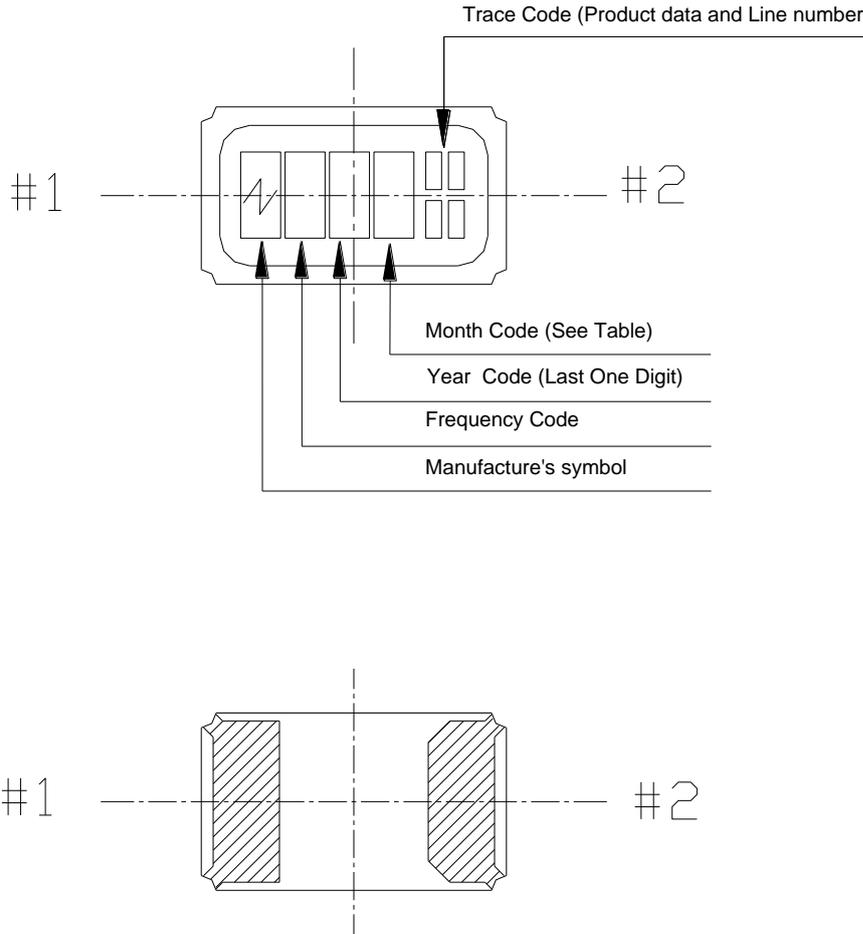
QTY.
3,000 PCS

Reel Drawing
 Material: Conductive PS
 EIAJ standard reel



	Date of Revise	Charge	Approved	Reason	
C	3 Aug.2012	Y.Hasuike	H.matsudo	Added of quantity	
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	31.Jul.2007	K.Oguri	Dimension:mm		/
Designed	31.Jul.2007	S. Kawanishi	Title 2012 TYPE Taping and Reel Spec.	Drawing No. EXK17B-00273 2/2	Rev.
Checked	-----	-----			C
Approved	31.Jul.2007	K. Ono			

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NOTE

1. Month Code

Month	1 Jan.	2 Feb.	3 Mar.	4 Apr.	5 May	6 June	7 July	8 Aug.	9 Sep.	10 Oct.	11 Nov.	12 Dec.
Month Code	1	2	3	4	5	6	7	8	9	X	Y	Z

2. Frequency Code

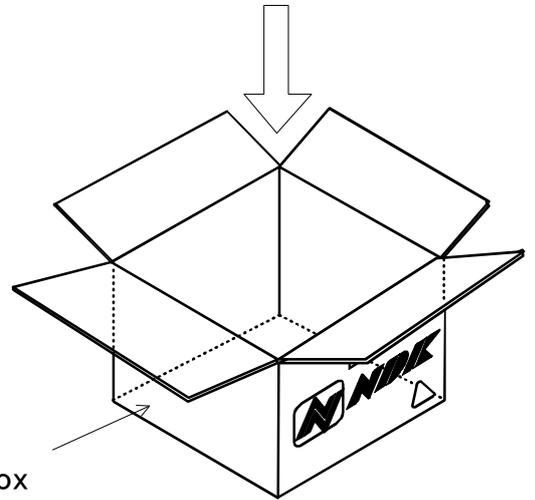
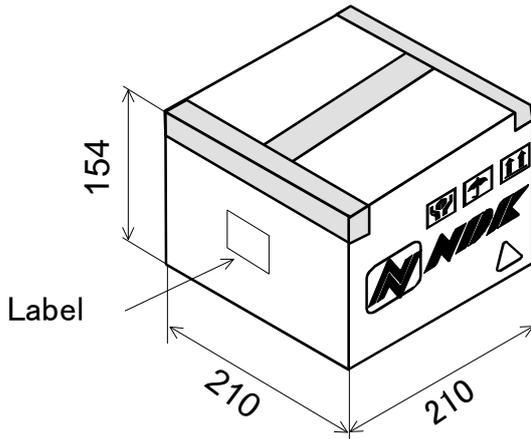
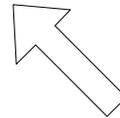
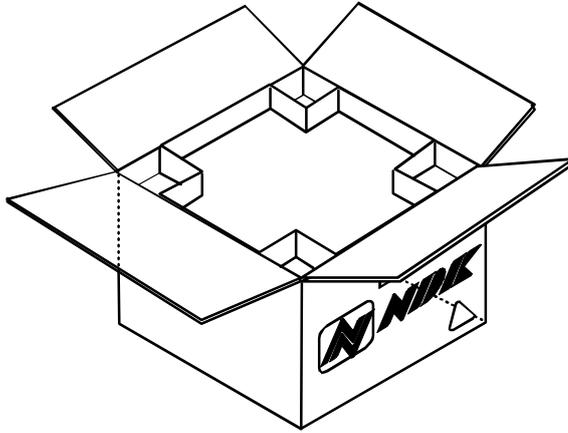
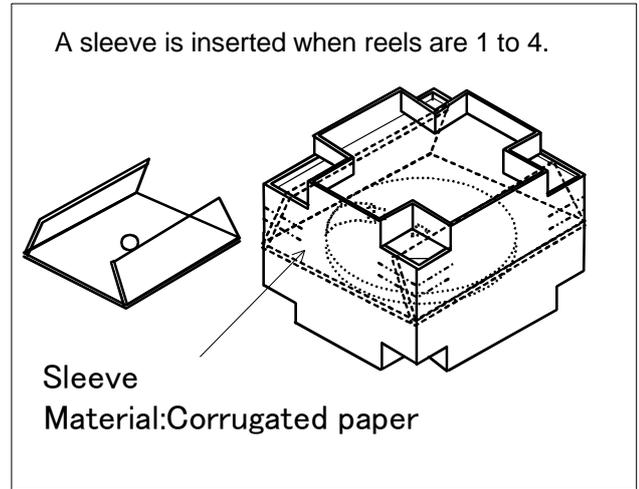
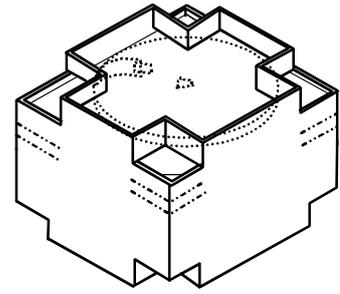
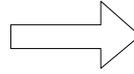
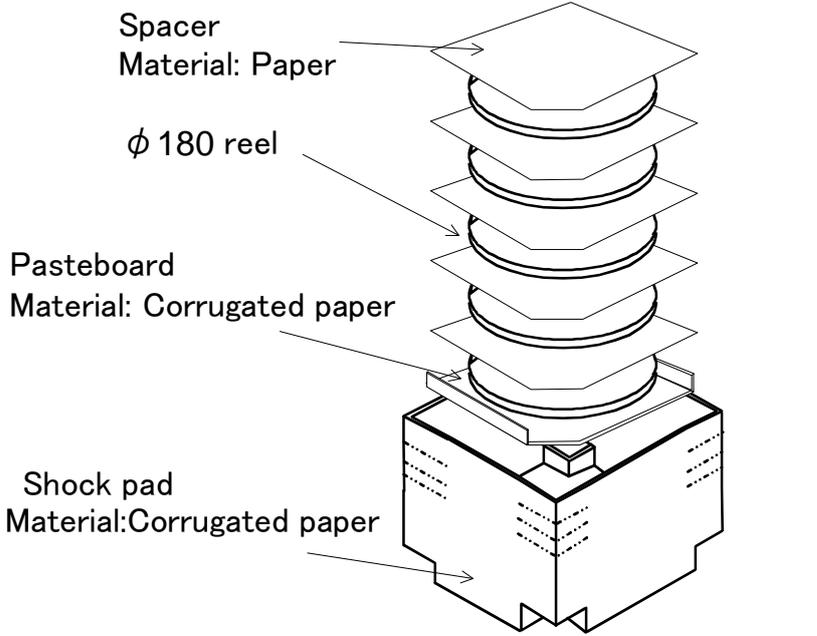
A : 32.768kHz

3. Marking Method

Marking Method is Laser Trimming.

	Date of Revise	Charge	Approved	Reason	
B	9.June.2010	S.Kawanishi	M.Umeki	To change the direction of crystal unit	
	Date	Name	Third Angle Projection	Tolerance	
Drawn	20.July.2007	S.Kawanishi	Dimension:mm	Scale	
Designed	20.July.2007	S.Kawanishi	Title NX2012SA Marking Drawing	Drawing No. EXH11B-00366	
Checked	20.July.2007	M.Yoshimatsu			Rev. B
Approved	20.July.2007	K.Ono			

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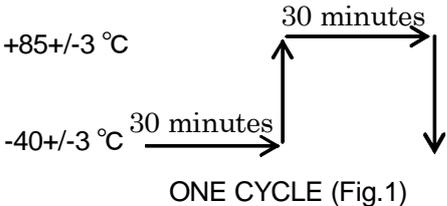
Outer box
Material: Corrugated paper

	Date of Revise	Charge	Approved	Reason	
C	4 Jul. 2012	H. Ohkubo	K. Oguri	Addition of condition when reels are 1 to 4.	
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	26 Feb. 2010	H. Ohkubo	Dimension:mm	-----	-----
Designed	26 Feb. 2010	K. Oguri	Title 180 dia. Reel package	Drawing No. EEK17B-00015	Rev.
Checked	26 Feb. 2010	K. Oguri			C
Approved	26 Feb. 2010	J. Nakamura			

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Reliability assurance item

(page: 1/2)

No.	Test Item	Test Methods	Specification Code
1	HEAT RESISTANCE	at +85 °C for 1000 hours.	a
2	COLD RESISTANCE	at -40 °C for 1000 hours.	a
3	HUMIDITY	at +85 °C with 80 to 85 % RH for 1000 hours.	a
4	THERMAL SHOCK	Temperature cycle as shown in (Fig.1) for 1000 cycle. 	a
5	VIBRATION	Frequency Range: 10 to 2000Hz Amplitude or Acceleration: 1.52 mm or 20 G. 1 cycle: 20 minutes. Test time: Three mutually perpendicular axes each 12 times.	a
6	SHOCK 1	Shock: 3000 Gs 0.3 msec. Test time: Six mutually perpendicular axes each 1 times.	a
7	SHOCK 2	Shock: Device are put on the weight of 140 g and dropped on concrete board. Height: 1.5 m Drop times: Three mutually perpendicular axes each 10 times.	b
8	SOLDERABILITY	Residual heat temperature: 150 °C Residual heat time: 60 to 120 sec. Peak temperature: 240°C (more than 215 °C 10 to 30 sec).	c
9	REFLOW RESISTANCE	Temperature cycle as shown in (Fig2.) for 3 cycle.	a

Specification code	Specification
a	dF/F ≤ +/- 10ppm dCl ≤ +/- 20 kohm
b	dF/F ≤ +/- 20ppm dCl ≤ +/- 20 kohm
c	The electrodes shall acquire a new solder coat over at least 90 % of immersed area.

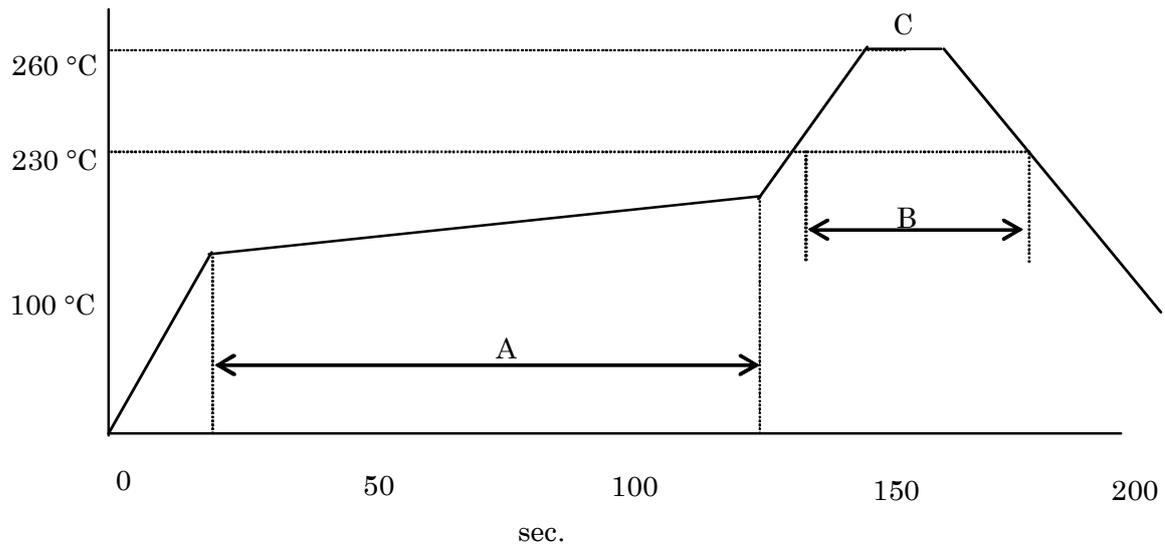


Fig.2 REFLOW

A: 150 to 180 °C (60 to 120 sec.)

B: 230 °C min. (30 sec. max.)

C: PEAK-TEMP. 260 °C +/- 5 °C (10sec. max.)