



RoHS Compliant
Directive 2011/65/EU

SPECIFICATION

Customer: Hwakwang Trading Co.,Ltd

Item:	CRYSTAL UNIT
Type:	NX2012SA
Nominal Frequency:	32.768kHz
Customer's Spec. No.:	---
NDK Spec. No.:	EXS00A-MU00646

Receipt

Charge:

Sales	Sales Dept.2: K.Takagi	Tel. 81-(0)3-5453-6737 e-Mail: takagik@ndk.com
Engineer	1 st Eng. Dept.: Hasuike	Tel. 81-(0)4-2900-6632 e-Mail: hasuike@ndk.com

Revision Record

Rev.	Date	Items	Contents	Approved	Checked	Drawn
---	8.Jan.2015	Issue	---	S.Sunaba	S.Kawanishi	Y.Hasuike

1. Customer's Spec. No. : ---
2. NDK Spec. No. : EXS00A-MU00646
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	9.0			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	~	+125	°C	-
4.8	Aging	-	+/-3			ppm	1 st year (at +25°C)
4.9	Drive level	DL	-	0.1	0.5	uW	-
4.10	Equivalent Resistance	R _r	-	-	110	kΩ	Network Analyzer (CNA-LF made in Transat corp.)
4.11	Shunt Capacitance	C ₀	1.0	1.3	1.6	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 be 500MΩ (Min.) when DC100V ±15V is applied.
4.13	Storage Temperature range	-	-40	~	+125	°C	-
4.14	Motional Capacitance	C ₁	4.0	5.0	6.0	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-00974

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

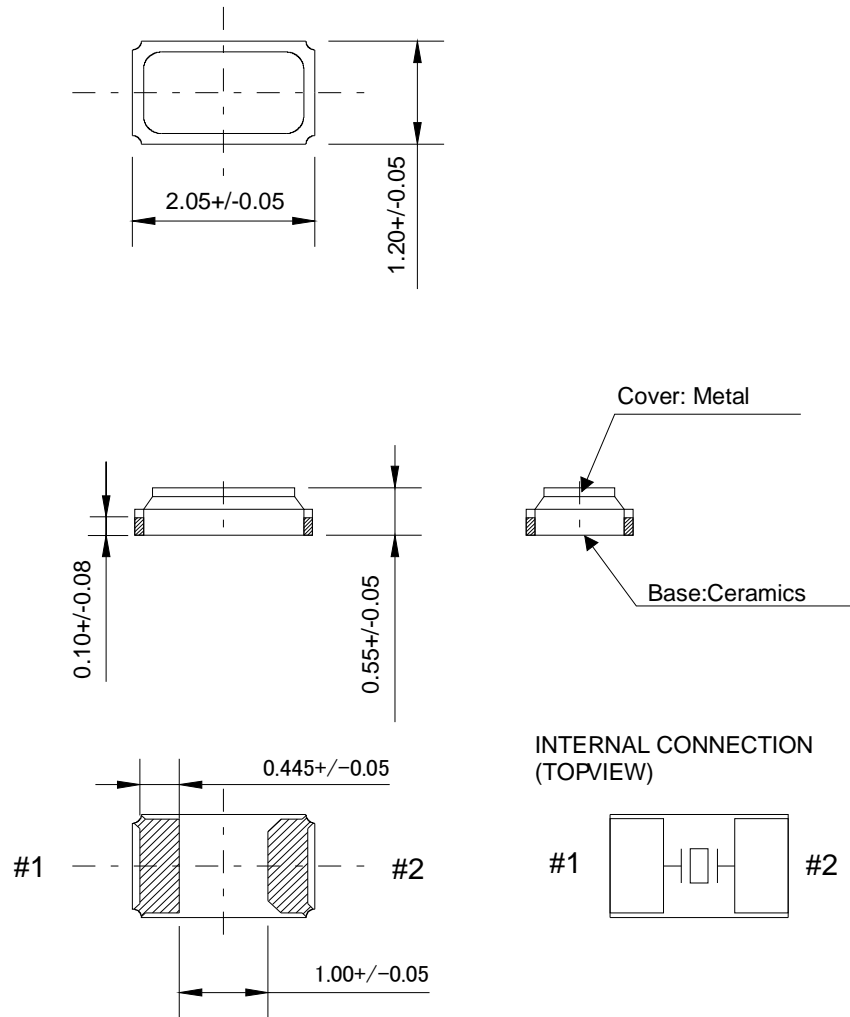
Be sure to use the product under the following conditions. Otherwise, the characteristics deterioration or destruction of the product may result.

(1)Reflow soldering heat resistance

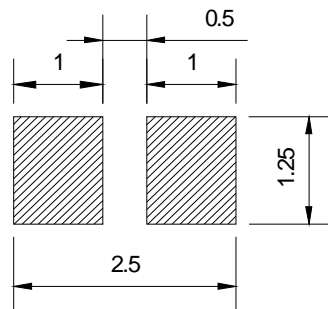
Peak temperature	: 265°C, 10 sec
Heating	: 230°C or higher, 30 sec
Preheating	: 150°C to 180°C, 120 sec
Reflow passage times	: twice

(2)Manual soldering heat resistance

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

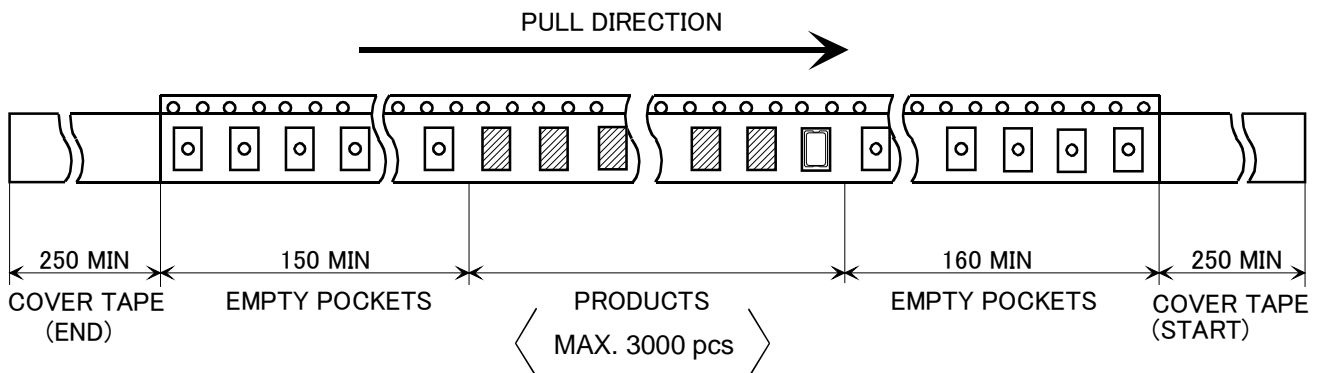
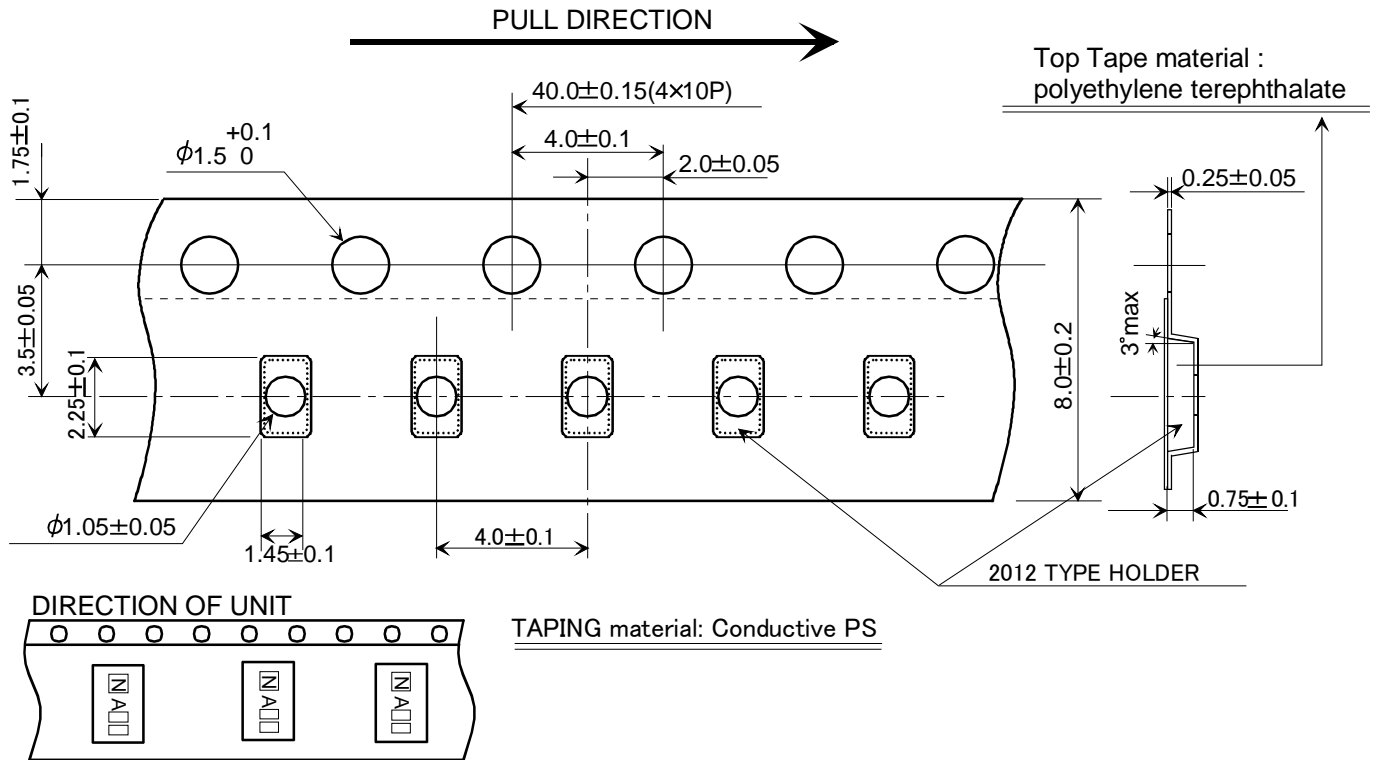


Recommended soldering pattern



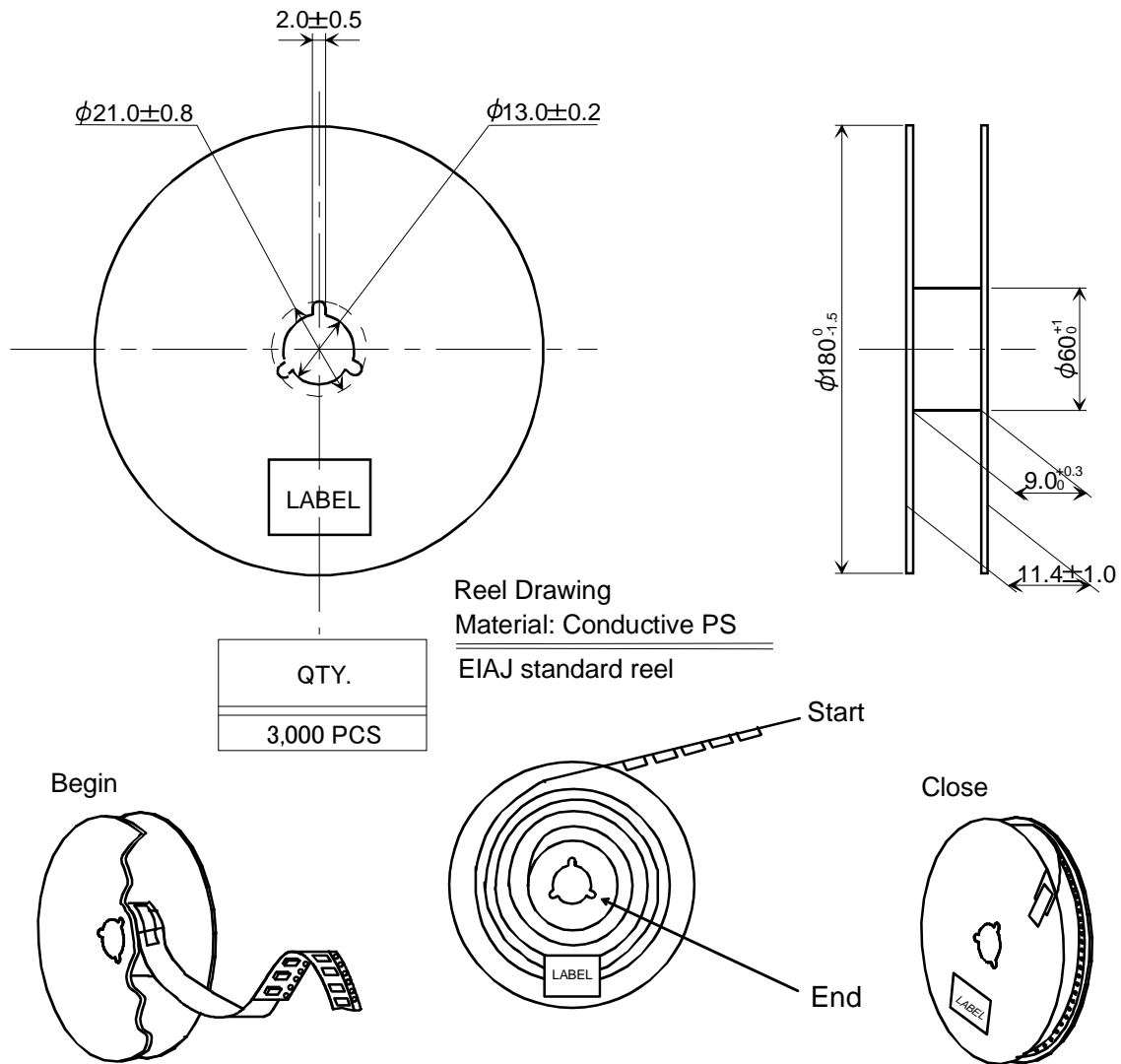
	Date of Revise		Charge	Approved	Reason				
D	3.Jul.2012		Y.Hasuike	H.Matsudo	Addeed Castellation				
		Date	Name	Third Angle Projection		Tolerance	Scale		
Drawn		17.July.2007	S.Kawanishi	Dimension:mm		±0.2	10 / 1		
Designed		17.July.2007	S.Kawanishi	Title NX2012SA External Dimension			Drawing No. EXD14B-00387		Rev
Checked		17.July.2007	M.Yoshimatsu						D
Approved		17.July.2007	K.Ono						

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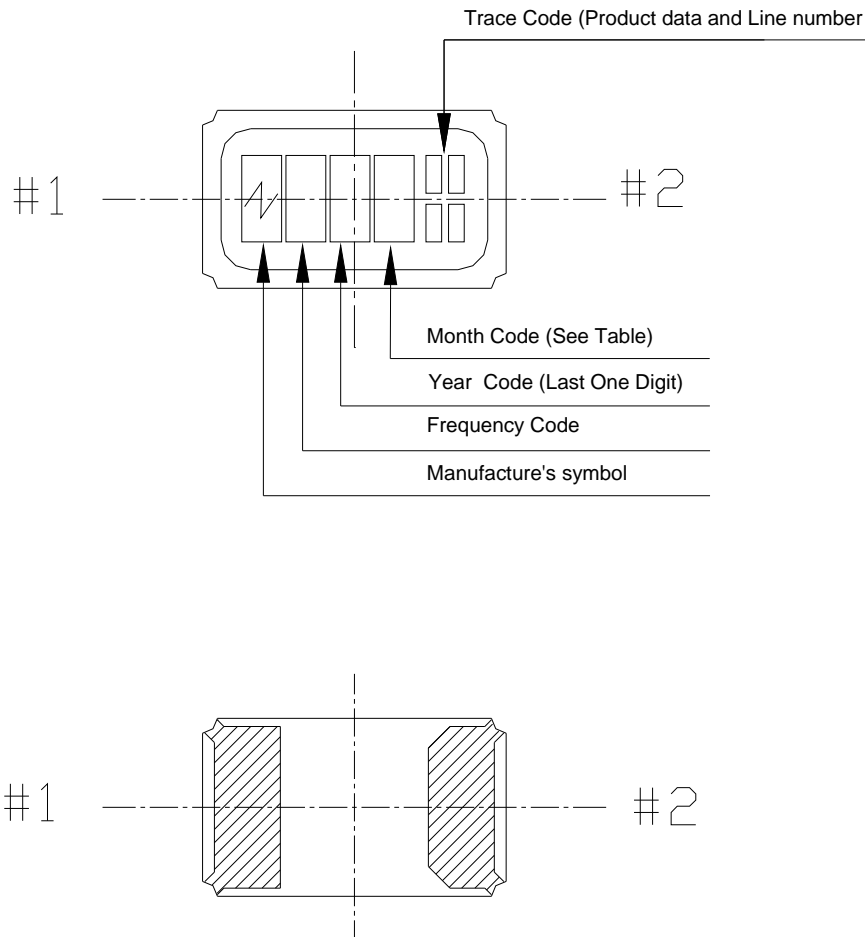
Date of Revise	Charge	Approved	Reason		
C 3 Aug.2012	Y.Hasuike	H.matsudo	Added of quantity		
Drawn	Date	Name	Third Angle Projection	Tolerance	Scale
31.Jul.2007	31.Jul.2007	K.Oguri	Dimension:mm		/
Designed	31.Jul.2007	S. Kawanishi	Title 2012 TYPE Taping and Reel Spec.	Drawing No. EXK17B-00273 1/2	Rev.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

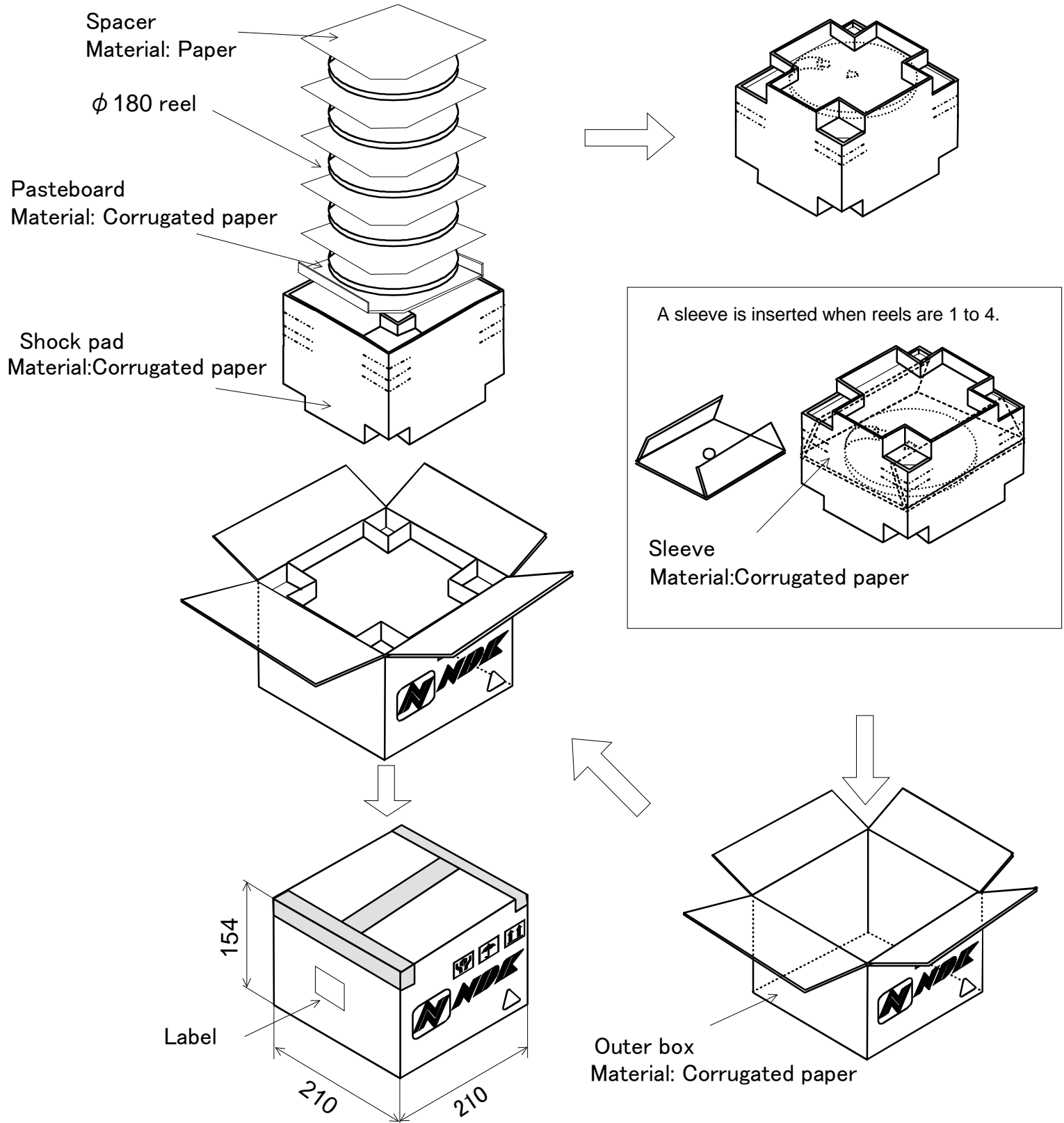
A : 32.768kHz

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		Scale
Drawn	20.July.2007	S.Kawanishi	Dimension:mm			/
Designed	20.July.2007	S.Kawanishi	Title NX2012SA Marking Drawing		Drawing No. EXH11B-00366	Rev.
Checked	20.July.2007	M.Yoshimatsu				B
Approved	20.July.2007	K.Ono				

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	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

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No.	Test Item	Test Methods	Specification Code
-	Preconditioning	AEC-Q200-REV C TABLE 4.2, Ref. : JESD22-A113 Temperature Cycling, Biased Humidity, Operational Life	
1	Pre- and Post- Stress Electrical Test	AEC-Q200-REV D TABLE 11 No. 1 Temperature : -40, +25, +125 °C	A,B
2	High Temperature Exposure (Storage)	AEC-Q200-REV D TABLE 11 No. 3, Ref. : MIL-STD-202 Method 108 Temperature : +125 °C Exposed time : 1000 h	C
3	Temperature Cycling	AEC-Q200-REV D TABLE 11 No. 4, Ref. : JESD22-A104 Temperature: -40 / +125 °C (30 min. dwell) Number of cycles: 1000 cycles	C
4	Biased Humidity	AEC-Q200-REV D TABLE 11 No. 7, Ref. : MIL-STD-202 Method 103 Temperature / Humidity : +85 °C, 85 %RH Exposed time : 1000 h Powered : Unpowered	C
5	Operational Life	AEC-Q200-REV D TABLE 11 No. 8, Ref. : MIL-STD-202 Method 108 Temperature : +125 °C Exposed time : 1000 h Powered : Unpowered	C
6	External Visual	AEC-Q200-REV D TABLE 11 No. 9, Ref. : MIL-STD-883 Method 2009	D
7	Physical Dimensions	AEC-Q200-REV D TABLE 11 No.10, Ref. : JESD22-B100 Verify physical dimensions to the applicable device detail specification.	E
8	Terminal Strength(Lead)	AEC-Q200-REV D TABLE 11 No.11, Ref. : MIL-STD-202 Method 211 Pull test : Condition A [2.23 N (227 g)] Bend test : Condition C [2.23 N (227 g)]	*1
9	Resistance to Solvents	AEC-Q200-REV D TABLE 11 No.12, Ref. : MIL-STD 202 Method 215 Solvent: Isopropyl alcohol Temperature: +25 °C	C,F,G
10	Mechanical Shock	AEC-Q200-REV D TABLE 11 No.13, Ref. : MIL-STD-202 Method 213 Condition C [981 m/s ² (100 G), Half sine shock pulse]	C
11	Vibration	AEC-Q200-REV D TABLE 11 No.14, Ref. : MIL-STD-202 Method 204 [10~2000 Hz, 49 m/s ² (5 G) for 20 min., 12 cycles each of 3 orientations.] PCB board.	C
12	Resistance to Soldering Heat	AEC-Q200-REV D, 3.2 Qualification of a Lead (Pb) – Free Device AEC-Q005 JESD22-A111, Table 1, Solder dip, Pb-free, 260 °C	C
13	Solderability	AEC-Q200-REV D, 3.2 Qualification of a Lead (Pb) – Free Device Preconditioning : AEC-Q005, Table 1, Condition A, Steam 1 h ± 5 min. Solderability : JESD22-B102, Method 2, Pb-free AEC-Q200-REV D TABLE 11 No.18, Ref. : J-STD-002 [SMD] (a) Method B [155 °C dry heat : 4 h, 235 °C] (b) Method B [Category : 3, 215 °C] (c) Method D [Category : 3, 260 °C]	H
14	Electrical Characterization	AEC-Q200-REV D TABLE 11 No.19 Temp. Characterization: -40, +25, +125 °C	A,B
15	Flammability	AEC-Q200-REV D TABLE 11 No.20, Ref. : UL-94 V-0 or V-1 acceptable	J *2
16	Board Flex	AEC-Q200-REV D TABLE 11 No.21, Ref. : AEC-Q200-005 Bend: 2 mm Holding time: 60+5 s	C,F
17	Terminal Strength(SMD)	AEC-Q200-REV D TABLE 11 No.22, Ref. : AEC-Q200-006 Shear force: 17.7 N (1.8 kg) Holding time: 60+1 s	C,F

Specification code	Specification
A	[+25°C] $\Delta F/F_0 \leq \pm 20\text{ppm}$, $R \leq 120\text{k}\Omega$
B	[-40/+125°C] $\Delta F/F \geq -442\text{ppm}$ with reference to 25°C, $R \leq 120\text{k}\Omega$
C	$\Delta F/F \leq \pm 20\text{ppm}$, $\Delta R \leq 20\text{k}\Omega$ make use larger value.
D	Inspect device construction, marking, and workmanship.
E	EXD14B-00387
F	Visual inspection to confirm no cracking of materials and no break of sealing. ($\text{He} \leq 1.1 \times 10^{-9} \text{ Pa}\cdot\text{m}^3/\text{s}$, No bubbles)
G	Marking shall be readable by visual.
H	95 % min. covered by new solder.
J	Ref. : UL-94 V-0 or V-1 acceptable.

Notes

*1 Terminal Strength (Lead) is not apply, because NX2012SA is SMD.

*2 Flammability is excepted, because NX2012SA does not have an inflammable portion.