Crystal Bridge to the Future

RoHS Compliant
Directive 2011/65/EU

SPECIFICATION

Customer: ST MICRO

Item:	CRYSTAL UNIT
Type:	NX2012SA
Nominal Frequency:	32.768kHz
Customer's Spec. No.:	---
NDK Spec. No.:	EXS00A-MU00527

Receipt

Revision Record

Rev.	Date	Items	Contents	Approved	Checked	Drawn
---	13.Mar.2014	Issue	---	S.Sunaba	---	Y.Hasuike
A	8.Mar.2018	Format	Changed Format.	S.Sunaba	S.Kawanishi	Y.Hasuike
		4.7 Operating Temperature range	Changed Temperature range.			
		4.10 Equivalent Resistance	Added Equivalent Resistance.			
		4.13 Operating Temperature range	Changed Temperature range.			
B	6.May.2021	7.5 Reliability assurance Item	Changed Reliability assurance Item	S.Kawanishi	H.Iwai	Y.Saito
C	3.Nov.2022	7.2 Taping and reel figure	Changed Taping and reel figure EXK17B-00273→EXK17B-00461	S.Kawanishi	H.Iwai	Y.Saito
		7.4 Reel Packing	Changed Reel Packing EEK17B-00015→EEK17B-00012			
D	21.Feb.2023	7.2 Taping and reel figure	Added Taping and reel figure EXK17B-00273	S.Kawanishi	H.Iwai	Y.Saito
		7.4 Reel Packing	Added Changed Reel Packing EEK17B-00054			

1. Customer's Spec. No. : ---

2. NDK Spec. No. : EXS00A-MU00527

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		6.0		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	1st year (at +25°C)
		-		+/-5		ppm	5 years (at +25°C)
		-		+/-10		ppm	10 years (at +25°C)
4.9	Drive level	DL	-	0.1	0.5	uW	-
4.10	Equivalent Resistance	R_r	-	-	80	kΩ	-40 to +85°C , Network Analyzer (CNA-LF made in Transat corp.) / Series
			-	-	120	kΩ	-40 to +125°C , Network Analyzer (CNA-LF made in Transat corp.) / Series
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 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.)
4.15	Motional Inductance	L_1	-	5000	-	H	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. Recommended oscillation margin

For stable oscillation, oscillation margin of min.240kΩ is recommended. When the circuit does not have enough value as above, please contact us.

7. Application drawing

7.1 Dimension drawing	: EXD14B-00387
7.2 Taping and reel figure	: EXK17B-00461 (applicable if quantity >15K)
	: EXK17B-00273 (applicable if quantity ≤15K)
7.3 Holder marking	: EXH11B-00366
7.4 Reel Packing	: EEK17B-00012 (applicable if quantity >15K)
	: EEK17B-00054 (applicable if quantity ≤15K)
7.5 Reliability assurance Item	: EXS30B-01032

8. Notice

8.1 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.

8.2 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.

8.3 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.

8.4 Where any change to the process condition is made due to the change(s) in the production line, inform personnel of the specifications.

8.5 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.

8.6 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.

8.7 In the company's production process whatever amount of ozone depleting substances (ODS) as specified in the Montreal protocol is not used.

8.8 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.

8.9 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.

8.10 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.

8.11 In case of the product long time keep at high temperature and humidity, may affect product characteristic (solder ability) and a packing condition. Please keep at storage condition of temperature +5°C ~+35°C, humidity ~85%RH.

9. Prohibited items

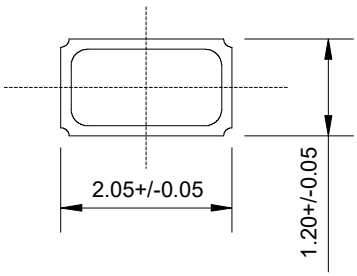
Be sure to use the product under the following conditions. Otherwise, the characteristics deterioration or destruction of the product may result.

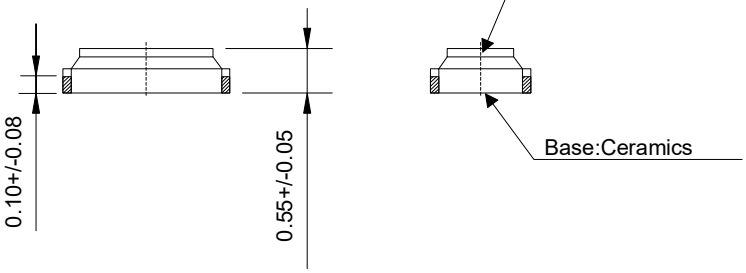
(1)Reflow soldering heat resistance

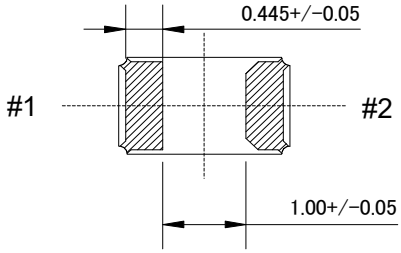
Peak temperature	: 265°C, 10 sec
Heating	: 230°C or higher, 30 sec
Preheating	: 150°C to 180°C, 120 sec
Reflow passage times	: twice

(2) Hand soldering heat resistance

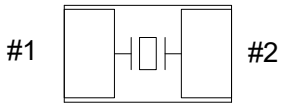
Pressing a soldering iron of 400°C on the terminal electrode for four seconds (twice) .



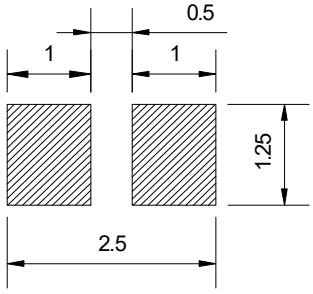




INTERNAL CONNECTION
(TOPVIEW)



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	Scale
Drawn	17.July.2007	S.Kawanishi	Dimension:mm	±0.2	10 / 1
Designed	17.July.2007	S.Kawanishi	Title	Drawing No.	Rev
Checked	17.July.2007	M.Yoshimatsu	**NX2012SA External Dimension**	**EXD14B-00387**	D
Approved	17.July.2007	K.Ono			

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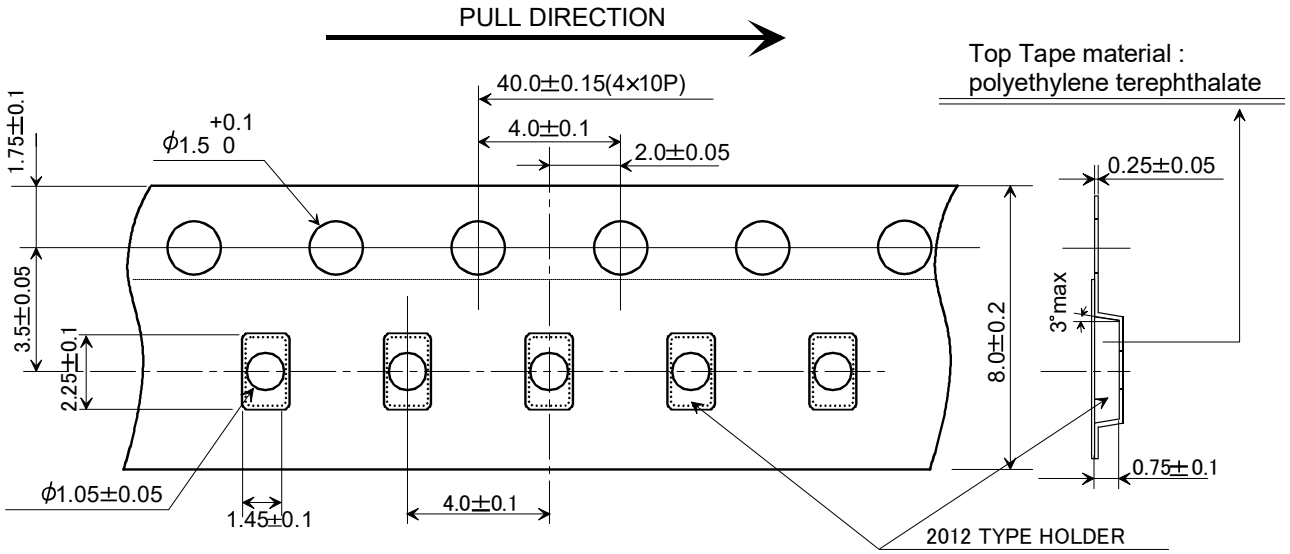
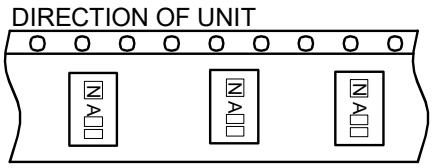
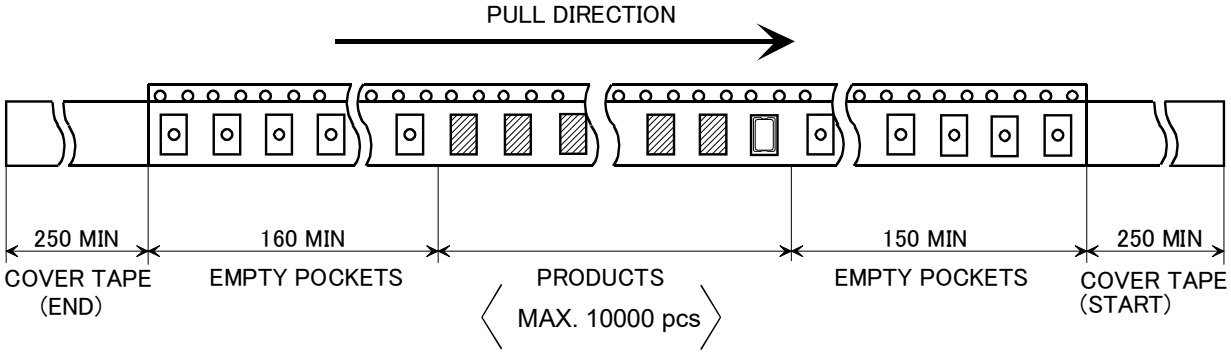




TAPING material: Conductive PS



	Date of Revise	Charge	Approved	Reason

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	1.Nov.2022	T.Iguchi	Dimension:mm		/
Designed	1.Nov.2022	T.Iguchi	Title	Drawing No.	Rev.
Checked	1.Nov.2022	D.Nishiyama	**2012 TYPE Taping and Reel Spec.**	**EXK17B-00461 1/2**	
Approved	1.Nov.2022	H.Murakoshi			

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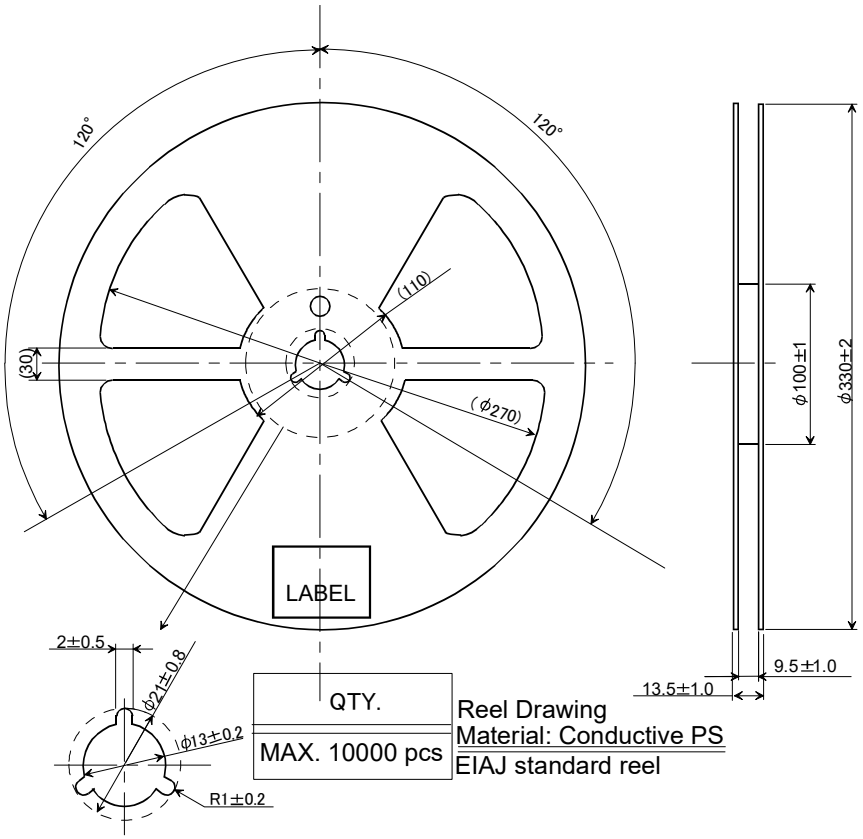
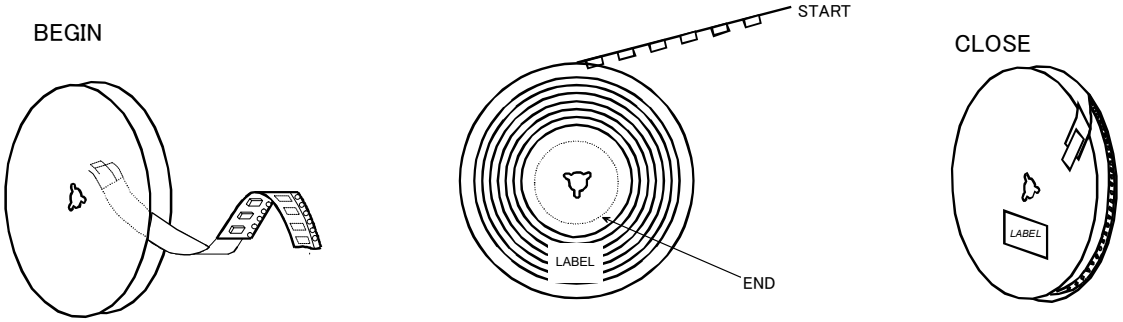


QTY.
MAX. 10000 pcs

Reel Drawing
Material: Conductive PS
EIAJ standard reel



	Date of Revise	Charge	Approved	Reason

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	1.Nov.2022	T.Iguchi	Dimension:mm		/
Designed	1.Nov.2022	T.Iguchi	Title	Drawing No.	Rev.
Checked	1.Nov.2022	D.Nishiyama	**2012 TYPE Taping and Reel Spec.**	**EXK17B-00461 2/2**	
Approved	1.Nov.2022	H.Murakoshi			

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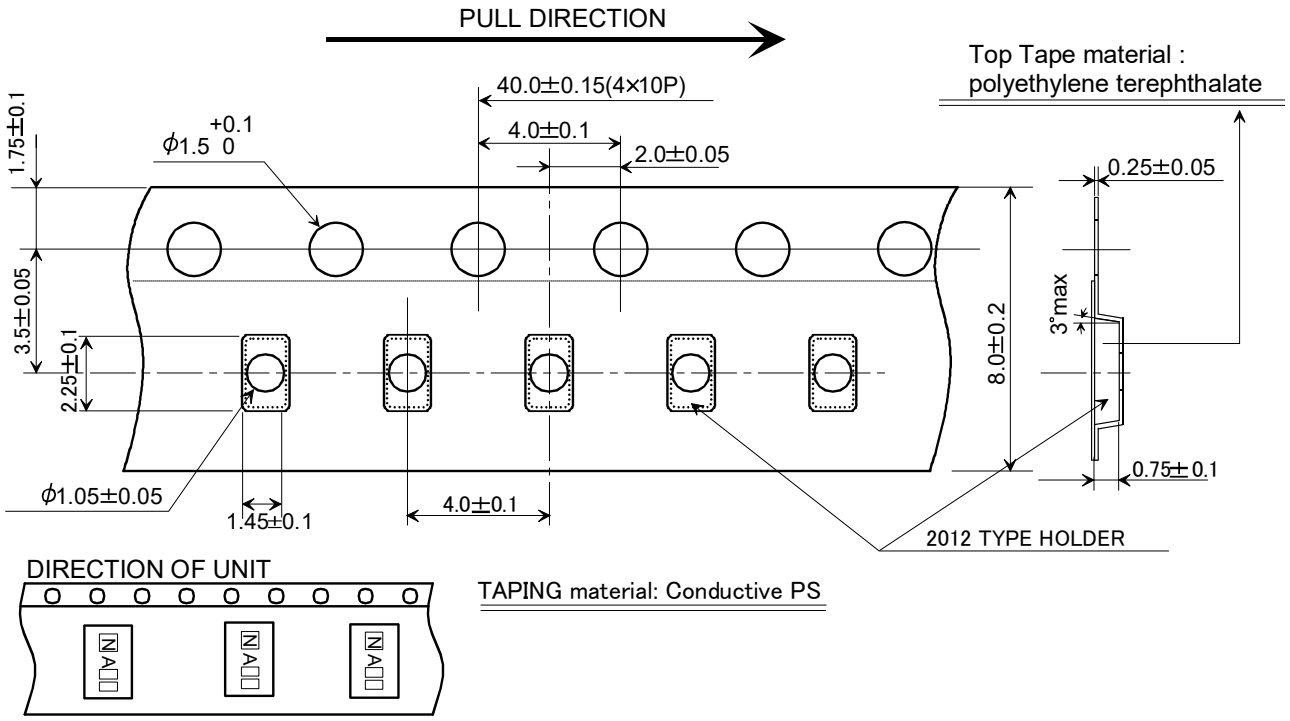
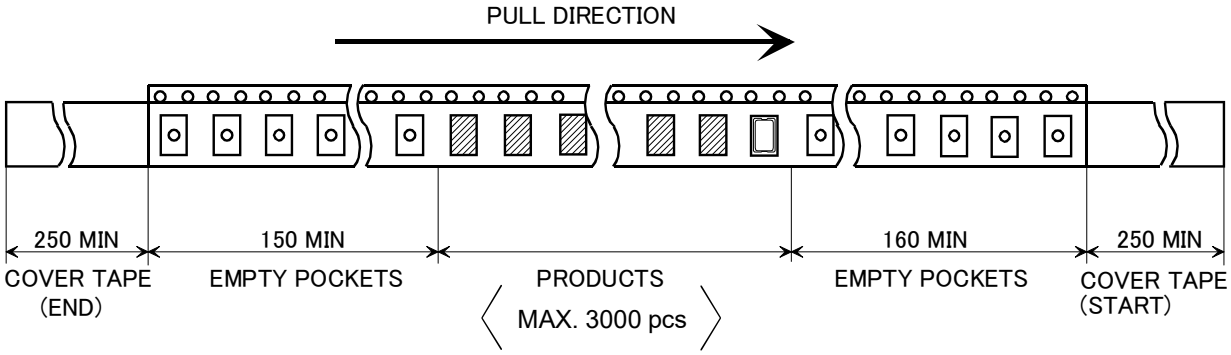
Form M-1





	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	Drawing No.	Rev.
Checked	----------	----------	**2012 TYPE Taping and Reel Spec.**	**EXK17B-00273 1/2**	C
Approved	31.Jul.2007	K. Ono			

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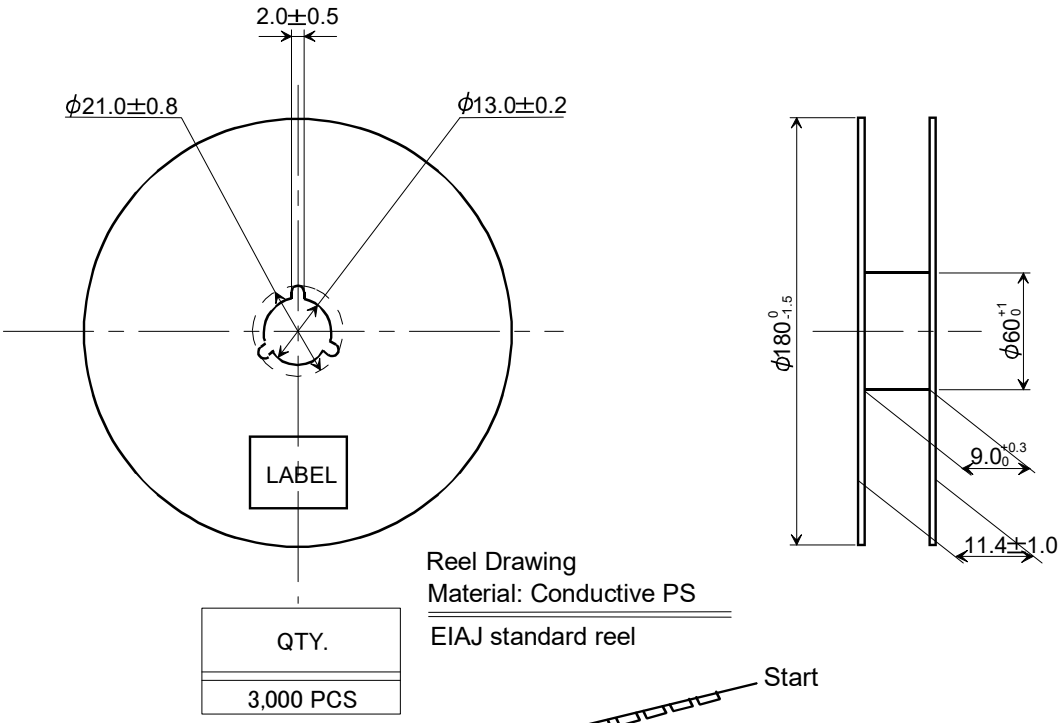
Form M-1

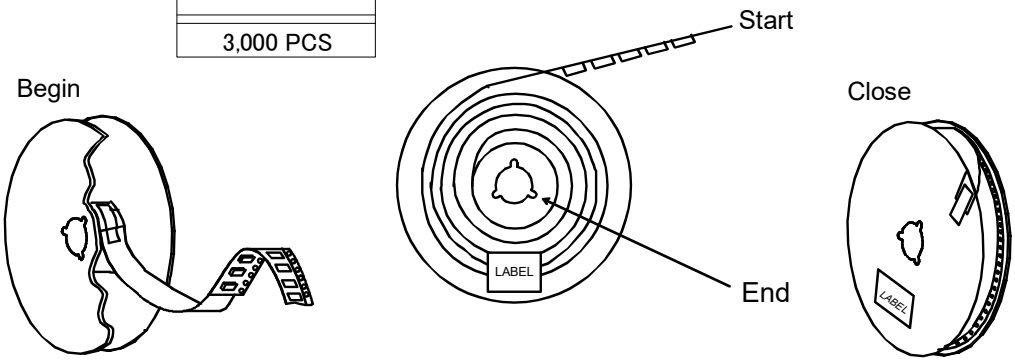


Reel Drawing

Material: Conductive PS

EIAJ standard reel

QTY.
3,000 PCS



	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	Drawing No.	Rev.
Checked	----------	----------	**2012 TYPE Taping and Reel Spec.**	**EXK17B-00273 2/2**	C
Approved	31.Jul.2007	K. Ono			

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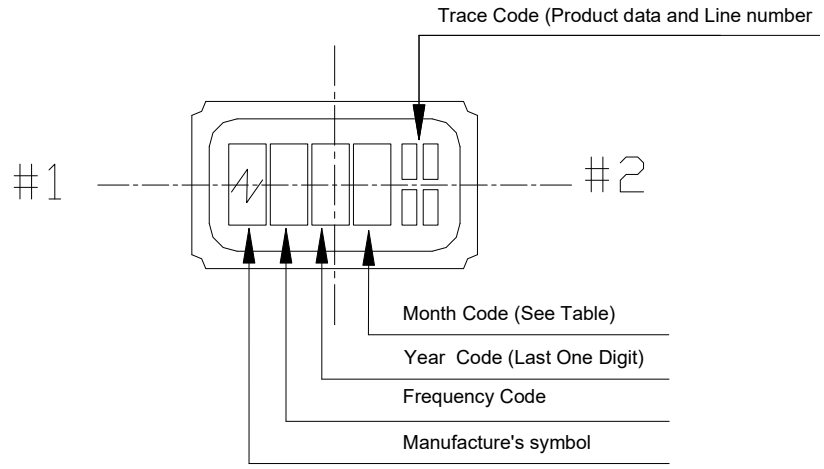
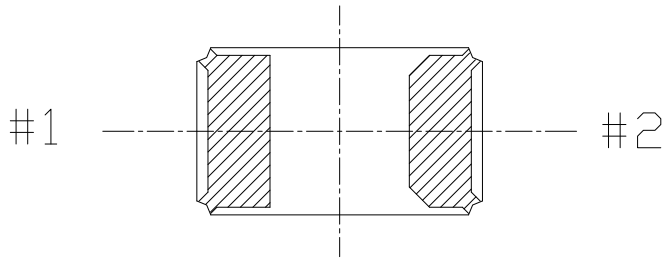
Form M-1





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	Drawing No.	Rev.
Checked	20.July.2007	M.Yoshimatsu	**NX2012SA Marking Drawing**	**EXH11B-00366**	B
Approved	20.July.2007	K.Ono			

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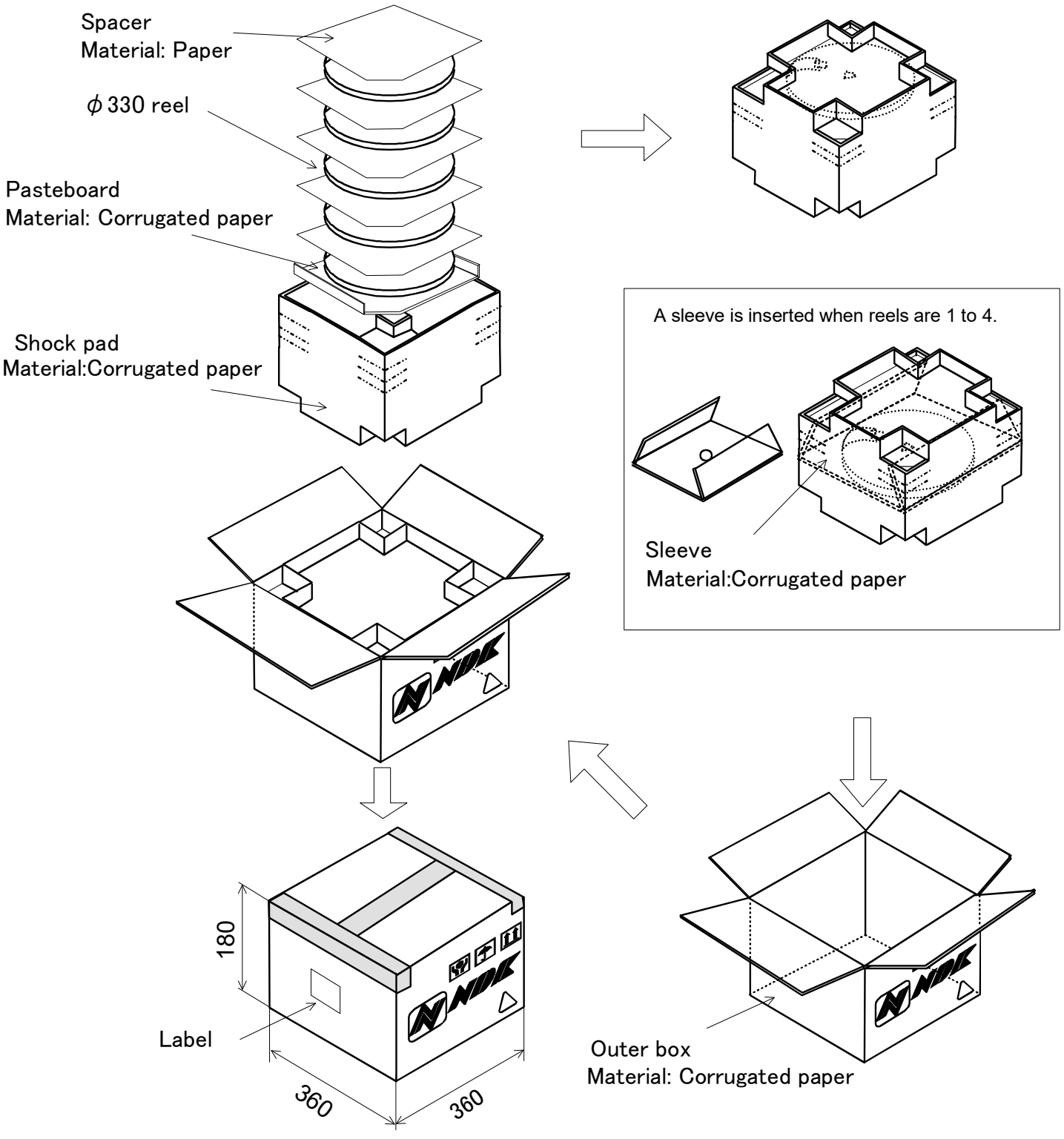

	Date of Revise	Charge	Approved	Reason
C	18 Nov. 2019	Y.Takano	H.Kobayashi	Correction of dimensions unit notion.

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	26 Feb. 2010	H. Ohkubo	Dimension:mm	---------	---------
Designed	26 Feb. 2010	K.Oguri	Title	Drawing No.	Rev.
Checked	26 Feb. 2010	K.Oguri	**330 dia. Reel package**	**EEK17B-00012**	C
Approved	26 Feb. 2010	J. Nakamura			

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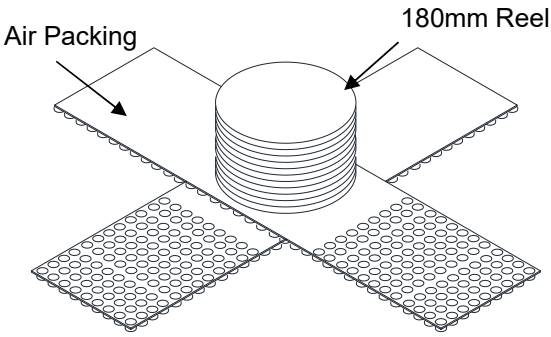
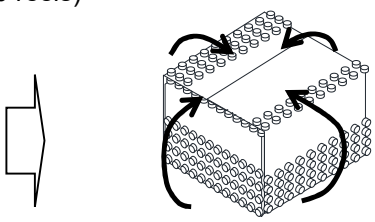
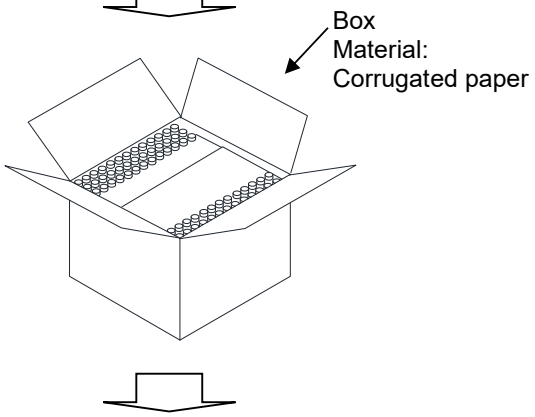
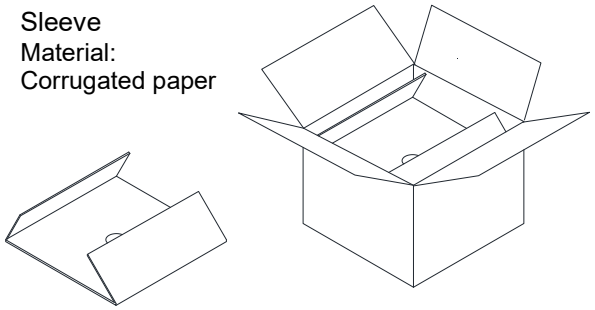


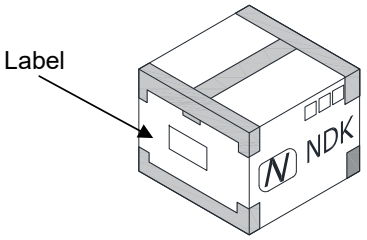




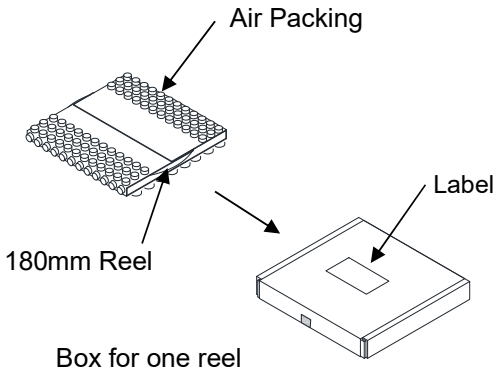
A sleeve is put in the box when few reel.

Sleeve
Material:
Corrugated paper





In the case of using Box for one reel



Box size(mm)

Carrier Tape Width	Type	L	W	H
8mm	Big box	200	200	165
	Middle box	200	200	105
	Box for one reel	195	215	35
12mm	Big box	200	200	205
	Middle box	200	200	125
	Box for one reel	195	215	35

*Big Box: (Max. 10 reels), Middle Box: (Max. 5 reels) or BOX for One reel is used accordance with reel quantity.

	Date of Revise	Charge	Approved	Reason
A	16 Sep. 2020	T. Shimizu	H. Murakoshi	注釈の一部削除、ラベルの追加、材質の追加/Delete of a part of note, addition of the label and material

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	10 Jul. 2020	T. Shimizu	Dimension:mm	---------	---------
Designed	10 Jul. 2020	T. Shimizu	Title	Drawing No.	Rev.
Checked	----------	----------	**180 dia. Reel package**	**EEK17B-00054**	A
Approved	10 Jul. 2020	H. Murakoshi			

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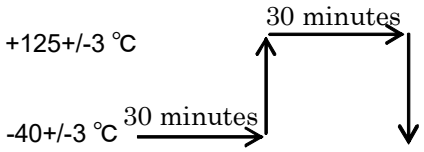
Reliability assurance item

(page: 1/2)

No.	Test Item	Test Methods	Specification Code
1	HEAT RESISTANCE	at +125 °C for 1000 hours.	b
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.  ONE CYCLE (Fig.1)	b
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 G 0.3 msec. Test time: Six mutually perpendicular axes each 1 time.	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 dCI ≤ +/- 20 kohm
b	dF/F ≤ +/- 20ppm dCI ≤ +/- 20 kohm
c	The electrodes shall acquire a new solder coat over at least 90 % of immersed area.

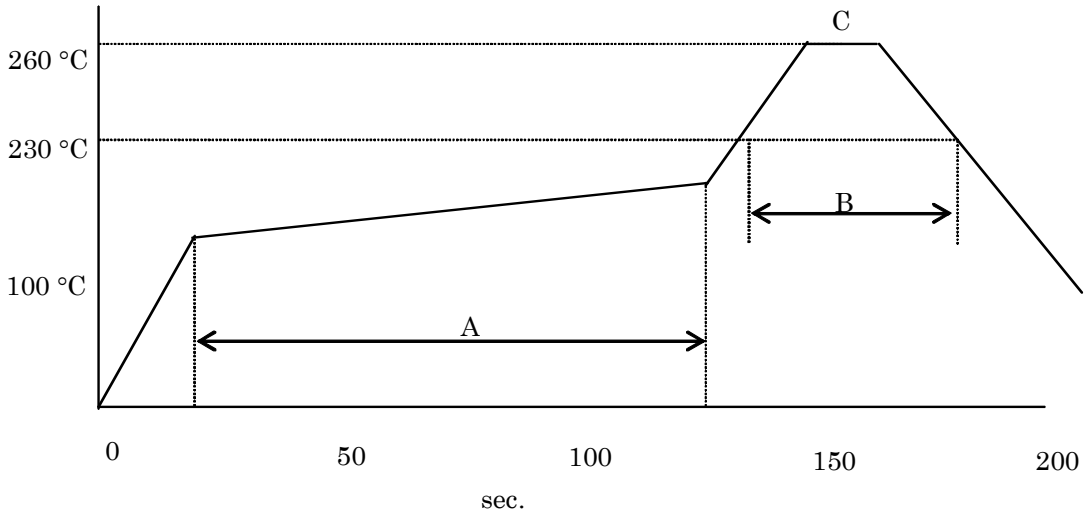


Fig.2 REFLOW

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.)