



SPECIFICATION

 Customer: TEXAS INSTRUMENTS

Item:	CRYSTAL OSCILLATOR
Type:	NT2016SA
Nominal frequency:	24 MHz
Customer's Spec. No.:	----
NDK Spec. No.:	END4938A

Receipt

Charge:

Sales	NDK-F David MAUREL	Tel. +33-1-60-95-0000 e-Mail: dmaurel@fr.ndk.com
Engineer	Engineering Dept. 3 A.Konda	Tel. +81-4-2900-6634 e-Mail: konda@ndk.com

Revision Record

Rev.	Date	Items	Contents	Approved	Checked	Drawn
-----	Jun. 11. 2015	Issue	---	A.Konda	A.Konda	E.Hoshi

1. Type NT2016SA

2. Maximum Rating

	Item	Rating	unit
1	Supply Voltage	-0.6 to +4.6	V
2	Storage temp. range	-40 to +85	°C

3. Electrical specification

	Parameters	Electrical Spec.				Notes
		Min.	Typ.	Max.	Units	
1	Nominal frequency		24		MHz	
2	Supply voltage (Vcc)	+1.7	+1.8	+1.98	V	(-Earth)
3	Current consumption			1.5	mA	
4	Output voltage	0.8			Vp-p	Clipped sine wave (DC-Coupling)
5	Operating temp. range	-30		+85	°C	
6	Load impedance (resistance part)	9	10	11	kΩ	
7	Load impedance (parallel capacitance)	9	10	11	pF	
8	DC-cut capacitor					DC-cut capacitor of output is not put in TCXO. Please add DC-cut capacitor (1000 pF) in output line.
9	Frequency stability					
	1. Frequency /Temperature characteristics	-2.5		+2.5	ppm	-30 to +85 °C Based on frequency at +25+/-2 °C
	2. Frequency/Voltage coefficient	-0.2		+0.2	ppm	+1.7 to +1.98 V
	3. Frequency/Load coefficient	-0.2		+0.2	ppm	(10 kΩ//10 pF) +/-10 %
	4. Frequency tolerance	-2.0		-2.0	ppm	+25+/-2 °C, before reflow soldering, based on nominal frequency
	5. Long-term frequency stability	-1.0		+1.0	ppm	year

4. Reflow soldering

After the reflow soldering, frequency deviation shall meet within max +/-1.0 ppm.
Based on frequency before the reflow soldering.
Conditions of temperature profile (Refer to Fig.1)
Soldering peak temp. +260 °C

5. Marking

- (1) Lot No.
- (2) Manufacture Name (NDK symbol mark)
- (3) Nominal frequency (MHz)
- (4) Trace code

6. Inspection parameters

Para 3.1, 3.3, 3.4, 3.9.1, 5, 10.2 are inspected.
The other parameters are guaranteed to be within specified characteristics by NDK design.
Inspection data is not submitted for mass production lot. But only if requested, a copy of first lot production data will be submitted.

7. Precaution in the storage

Please keep the oscillator in the ordinary temperature and humidity that are suggested as below table.

	Before taking out of dry bag	After taking out of dry bag
Temperature	+5 °C to +45 °C	+30 °C max.
Humidity	10 % to 75 % RH	70 % max.
Period	6 months	168 hours *

(table)

*It is desirable for the oscillator to be used within 168 hours after taking out of dry bag.

Please pack the oscillator into used dry bag with a desiccant and seal it up by heat sealer etc.

In case the heat sealer is not available, sealing up with cellophane tape or a vinyl tape will do.

8. Frequency establishment condition

When output frequency is set, we suppose to have the ground pattern under the oscillator.

9. Washing

Not available for washing.

10. Application drawing

10.1 Reliability assurance item

ETS30B-00399

10.2 Dimension of External

ETD14B-01324A

10.3 Packing

ETK17B-00302A

10.4 Land pattern

ETD15B-00020A

10.5 Marking

ETH11B-00443B

11. Notice

11.1 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.

11.2 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.

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

11.4 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.

11.5 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.

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

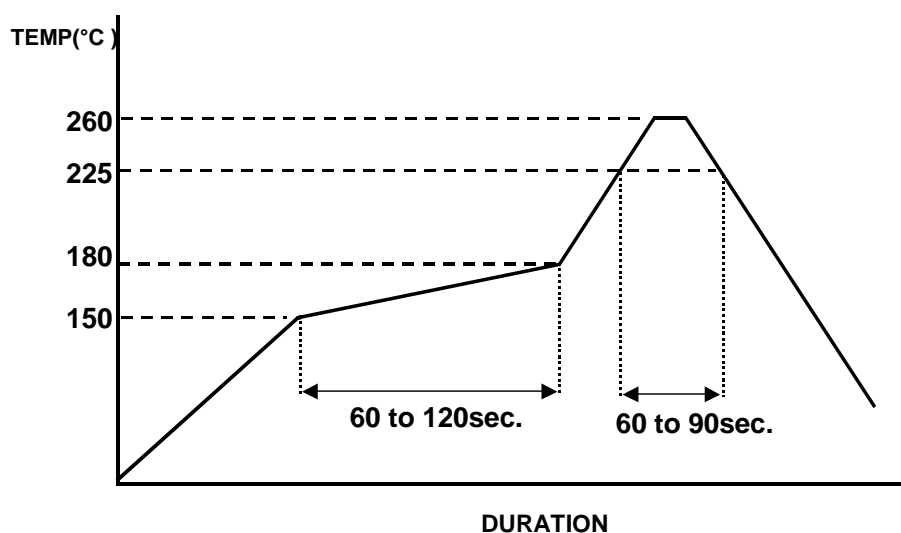
11.7 Information contained in this specification must not be quoted, reproduced or used for other purposes including processing either in part or in full without obtaining prior approval from the company.

- 11.8 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.
- 11.9 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.
- 11.10 If you use resin for fixing components during manufacturing, please keep resin from adhering to the oscillator.

12. 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
 - Heating: +225 °C or higher, 90 sec
- (2) Manual soldering heat resistance
 - Pressing a soldering iron of +410 °C on the terminal electrode for five seconds.



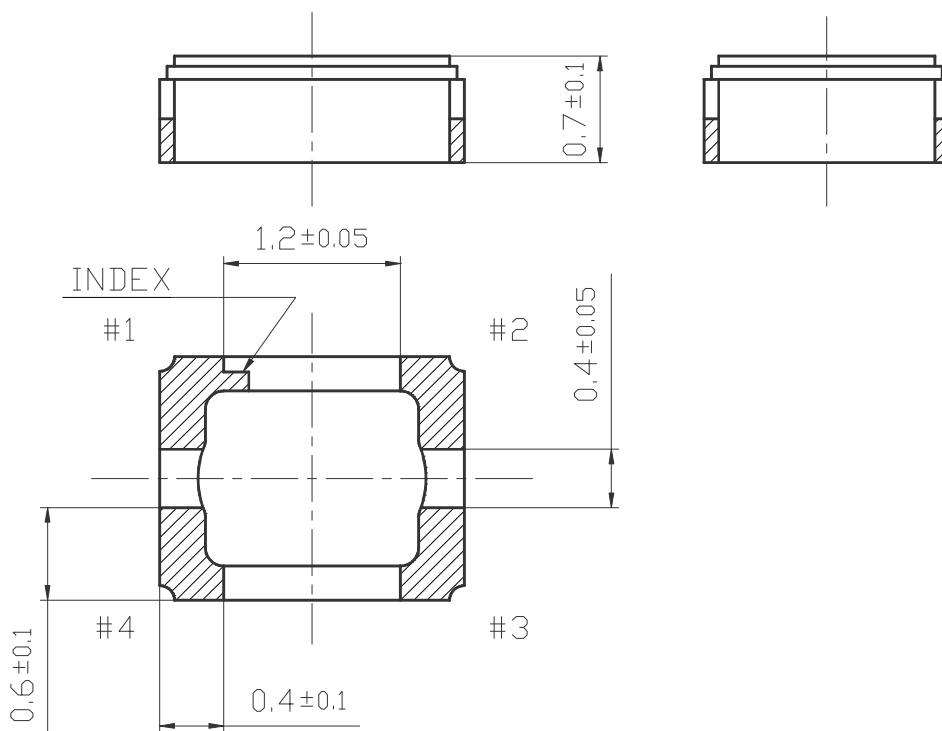
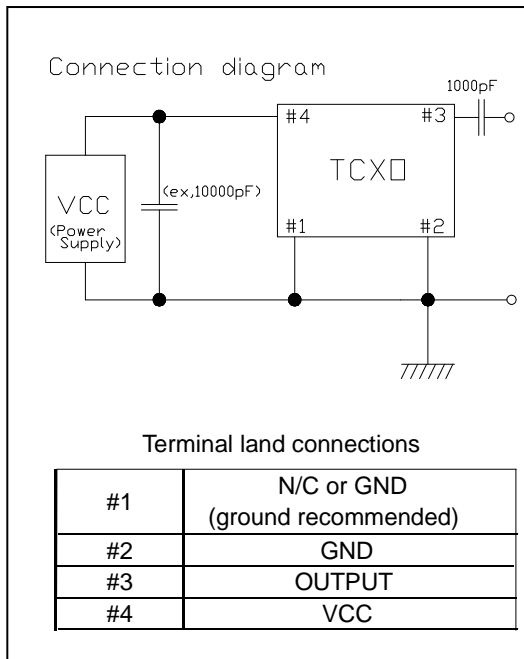
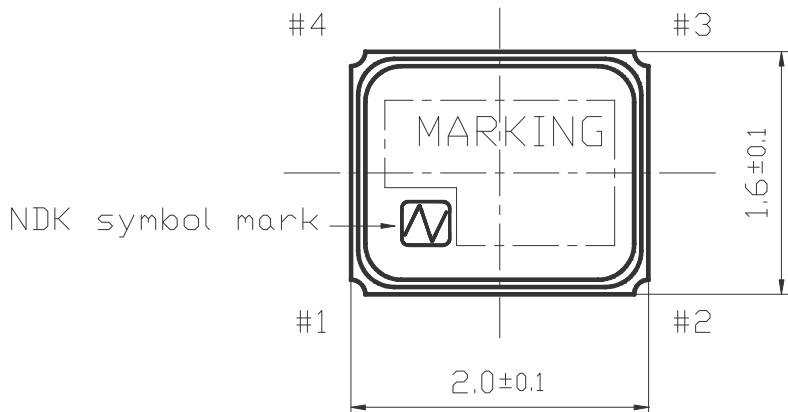
(Fig.1)

Reliability assurance item

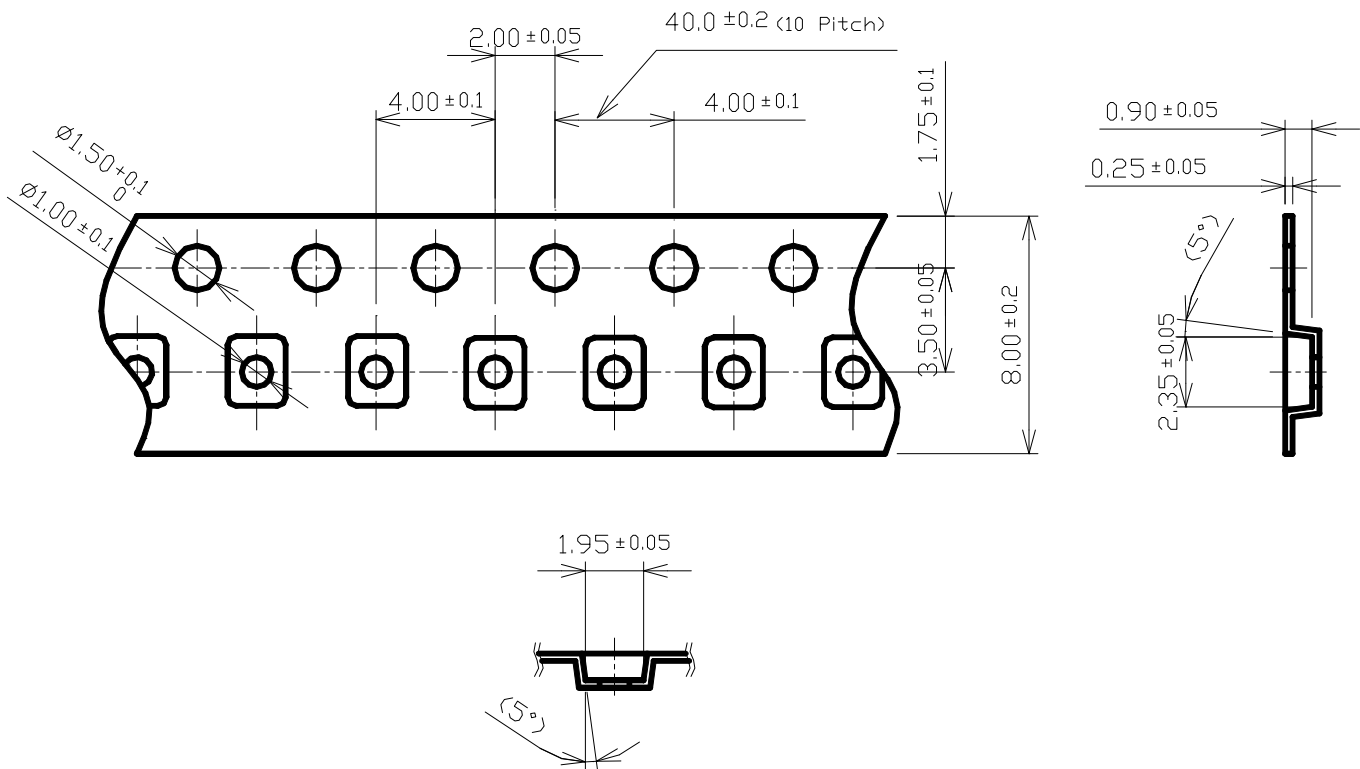
(page: 1/1)

No.	Test Item	Test Methods	Specification Code
1	Vibration	5 to 26Hz: 1.52mm (total amplitude) 26 to 500Hz: 19.6m/s ² 20 minutes per 1 cycle. 2 hours for each 3 planes.	A
2	Shock	Half sine wave 6ms, 980 m/s ² . 3 times for each 3 planes.	A
3	Drop Test	Drop freely on the concrete from the height of 150cm With jig(150g). 3time for each 6 planes.	A
4	Humidity	+60°C, 95% RH for 48H. And normal temperature, with normal humidity for 24H.	A

Specification code	Specification
A	After the test, shall meet electrical specification.



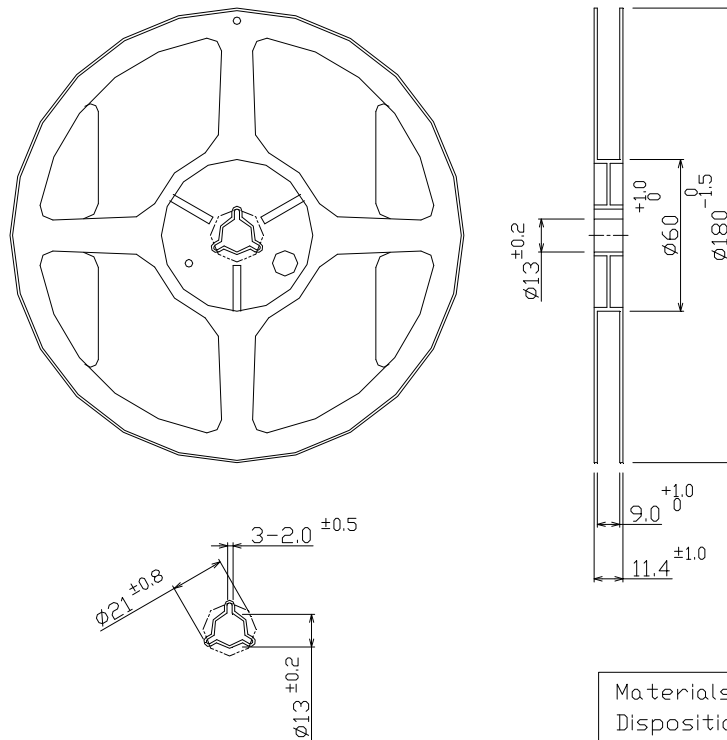
Date of Revise	Charge	Approved	Reason	
A 24.Oct.2013	C.Sakurai	A.Konda	change of Hatching and connection diagram (I According to EEN01A-0005)	
Date	Name	Third Angle Projection	Tolerance	Scale
Drawn 8.Oct.2009	M.Kashiwamura	Dimension:mm	+/- 0.2	20 / 1
Designed 8.Oct.2009	Y.Kanehira	Title	Drawing No.	Rev.
Checked 8.Oct.2009	K.Moriya			
Approved 8.Oct.2009	K.Moriya			
Dimension of External			ETD14B-01324	A



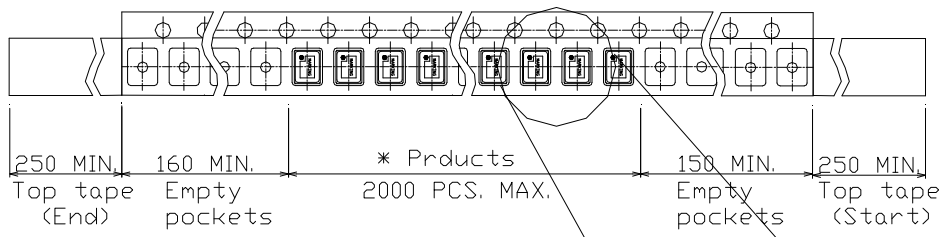
	Embossed carrier tape	Top cover tape
Materials	PS	PET + PE + Adhesive layer
Disposition	Antistatic	Antistatic

	Date of Revise	Charge	Approved	Reason	
A	18.Nov.2010	R.Yoshizaki	K.Moriya	Amount addition	
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	19.May.2010	M.Kashiwamura	Dimension:mm	-----	3/1
Designed	19.May.2010	M.Kashiwamura	Title	Drawing No.	Rev.
Checked	19.May.2010	K. Moriya			
Approved	19.May.2010	K. Moriya			
			Packing	ETK17B-00302 (1/3)	A

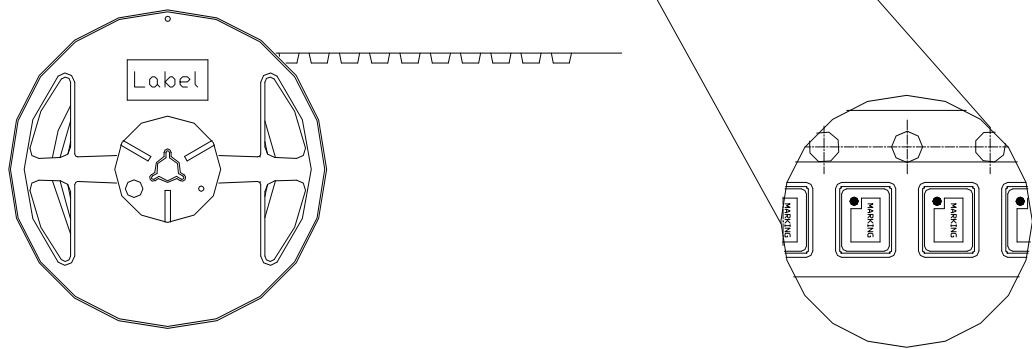
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Materials : PS
Disposition : Antistatic



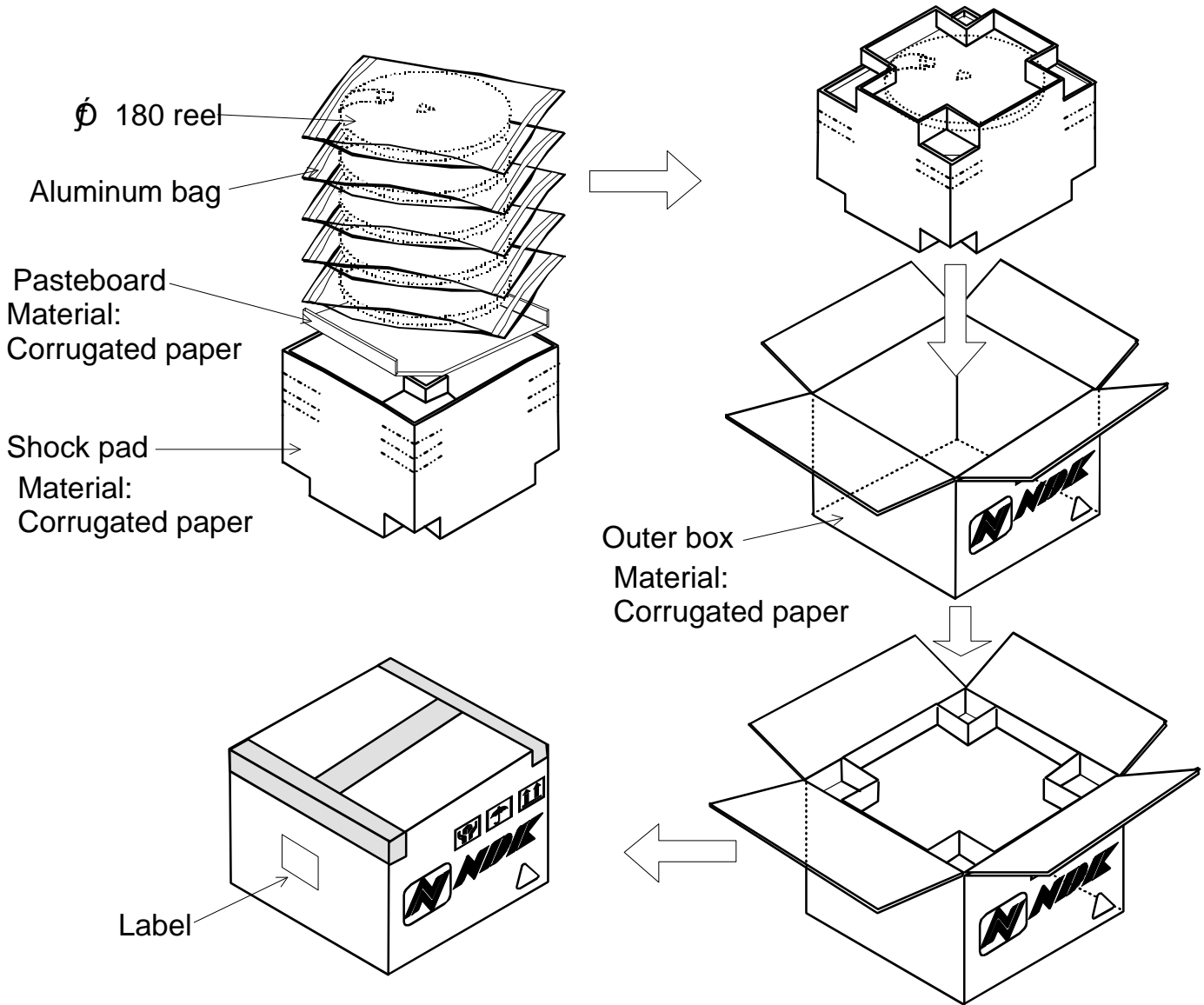
* There are no vacant pockets for this area.



	Date of Revise	Charge	Approved	Reason
A				
	Date	Name	Third Angle Projection	Tolerance
Drawn	19.May.2010	M.Kashiwamura	Dimension:mm	-----
Designed	19.May.2010	M.Kashiwamura	Title	Drawing No.
Checked	19.May.2010	K. Moriya		
Approved	19.May.2010	K. Moriya		
			Packing	ETK17B-00302 (2/3)
				Rev. A

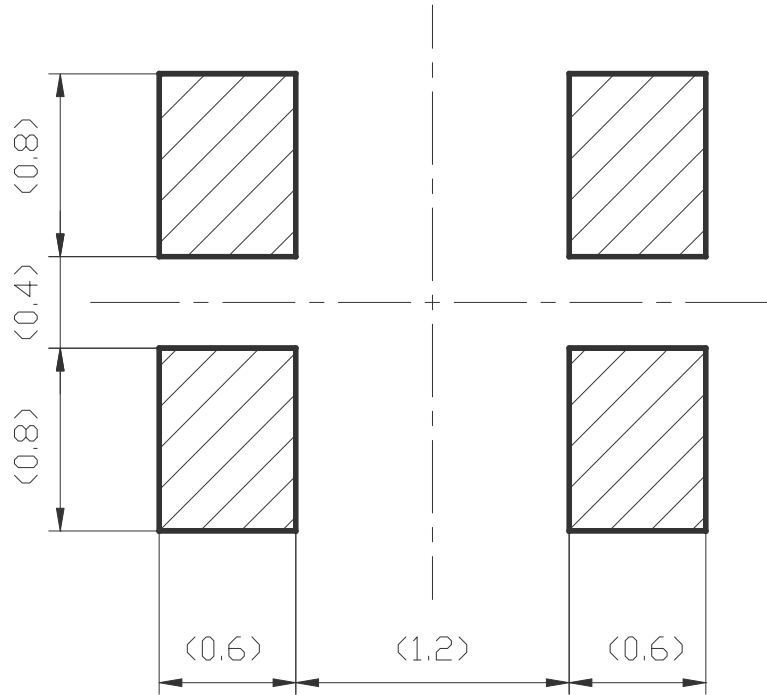
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-2000pcs.Max./Reel
 -5 Reels Max./Carton



	Date of Revise	Charge	Approved	Reason	
A					
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	19.May.2010	M.Kashiwamura	Dimension:mm	----	----
Designed	19.May.2010	M.Kashiwamura	Title	Drawing No.	Rev.
Checked	19.May.2010	K. Moriya			
Approved	19.May.2010	K. Moriya			
Packing			ETK17B-00302 (3/3)		A

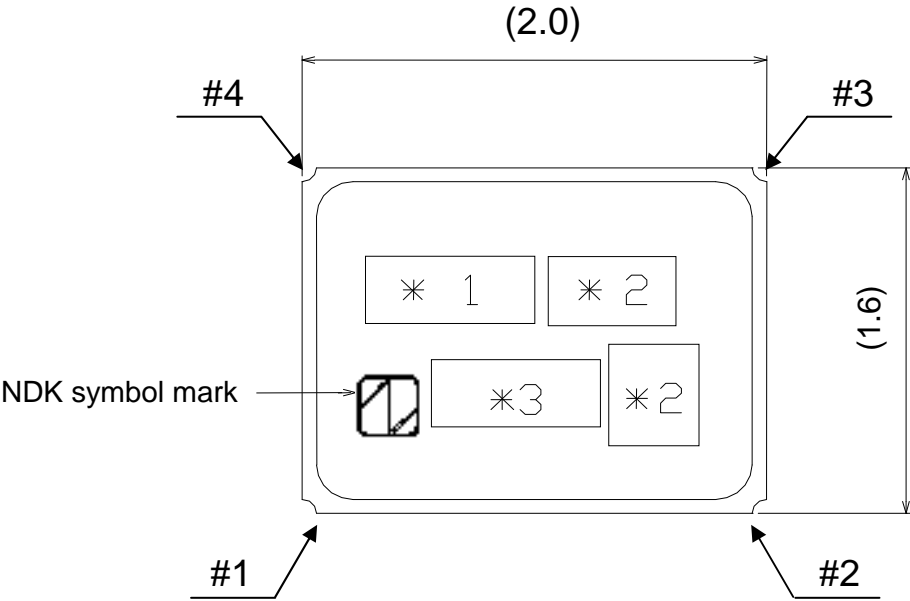
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Note) Please reserve a large ground pattern on the PCB where the oscillator is installed.

	Date of Revise	Charge	Approved	Reason	
A	8.Jul.2011	Y.Kanehira	A.Konda	Change Note	
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	19.Mar.2007	H.Harima	Dimension:mm	-----	30 / 1
Designed	19.Mar.2007	H.Harima	Title	Drawing No.	Rev.
Checked	19.Mar.2007	K.Moriya			
Approved	19.Mar.2007	H.Mizumura			
			Land pattern	ETD15B-00020	A

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Terminal land connections: Please refer to “Dimension of External”.

(Marking Contents)

*1 Lot No.



Year Code(Last one digit)

Month Code(see table)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Month Code	1	2	3	4	5	6	7	8	9	O	N	D

Following No.

*2 Trace code

Trace code indicates production date and production line number.

*3 Nominal Frequency

- A unit (MHz) is not written.
- A decimal point omits.

(Example : (2digits) 26MHz → 26 , (3digits) 19.2MHz → 192, (4more digits) 16.368MHz → 163)

Marking Method : Laser Trimming

	Date of Revise	Charge	Approved	Reason		
B	4. Mar. 2015	E.Hoshi	A.Konda	Clerical error Correction		
	Date	Name	Third Angle Projection	Tolerance	Scale	
Drawn	16. Apr. 2013	R.Yoshizaki	Dimension:mm	---	---	
Designed	16. Apr. 2013	R.Yoshizaki	Title	Drawing No.	Rev.	
Checked	16. Apr. 2013	M.Kashiwamura			B	
Approved	16. Apr. 2013	K.Moriya			B	
			Marking		ETH11B-00443	

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