Crystal Bridge to the Future

RoHS Compliant
Directive 2011/65/EU

SPECIFICATION

Customer: STMICRO ELECTRONICS

Item: CRYSTAL OSCILLATOR

Type: NT2016SB

Nominal frequency: 50 MHz

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

NDK Spec. No.: END4330A

Receipt

Revision Record

Rev.	Rev. Date	Items	Contents	Approved	Checked	Drawn
-----	Nov. 24. 2011	Issue		T.Wada	T.Abe	A.Konda
A	Dec. 1. 2011	Type 1 Type 2.2 Input voltage range of Enable/Disable Terminal 3.3 Current consumption 4.7 Enable/Disable function 11.2 Dimension of External 11.5 Marking	NT2016SA → NT2016SB NT2016SA → NT2016SB Addition Addition Addition ETD14B-01324 →ETD14B-01230B ETH11B-00316A → ETH11B-00401	T.Wada	T.Abe	A.Konda
B	Jun. 4. 2013	3.2 Supply voltage 4.1.2 Frequency /Voltage coefficient	+2.8 V +/- 0.1 V DC →+2.5 V +/- 0.1 V DC +3.3 V +/- 0.1 V DC Max. +/-0.2 ppm / +2.8 V +/-0.1 V →Max. +/-0.2 ppm / +2.5 V +/-0.1 V	K.Moriya	A.Teranishi	C.Sakurai
C	May. 8. 2014	3.2 Supply voltage 11.2 Dimension of External	Max.+3.6 V Addition ETD14B-01230B → ETD14B-01230C			
D	May. 14. 2018	3.2. Supply voltage 4.1.2 Frequency /Voltage coefficient	+2.5 V +/-0.1 V、+3.3 V +/-0.1 V Max.+3.6 V →+2.4 to +3.6 V(Typ.+3.3 V) +2.5 V +/-0.1 V → +2.4 to +3.6 V	K.Moriya	S.Kawahara	S.Kawahara

1. Type
   NT2016SB

2. Maximum rating
   2.1 Supply Voltage
      -0.6 to +4.6 V
   2.2 Input voltage range of Enable/Disable Terminal
      -0.6 V to V_{CC} +0.6 V Max. +4.6 V
   2.3 Storage temp. Range
      -40 to +85 °C

3. Rating
   3.1 Nominal frequency
      50 MHz (2 digits marking)
   3.2 Supply voltage
      +2.4 to +3.6 V(Typ.+3.3 V) (-Earth)
   3.3 Current consumption
      Enabled: Max. 2.0 mA
      Disabled: Max. 3 uA
   3.4 Output voltage
      Min. 0.8 Vp-p Clipped sine wave (DC-Coupling)
   3.5 Operating temperature range
      -30 to +85 °C
   3.6 Load impedance
      (10 kΩ // 10 pF) +/-10 %
   3.7 DC-cut capacitor
      DC-cut capacitor of output is not put in TCXO.
      Please add DC-cut capacitor (1000 pF) in output line.

4. Electrical specification
   4.1 Frequency stability
      4.1.1 Frequency / temperature characteristics
         Max. +/-2.5 ppm / -30 to +85 °C
         (Based on frequency at +25 +/-2 °C)
      4.1.2 Frequency/Voltage coefficient
         Max. +/-0.2 ppm / +2.4 to +3.6 V
      4.1.3 Frequency/Load coefficient
         Max. +/-0.2 ppm / (10 kΩ // 10 pF) +/-10 %
      4.1.4 Frequency tolerance
         Max. +/-1.5 ppm (at +25+/-2 °C, before reflow soldering, based on nominal frequency)
      4.1.5 Long-term frequency stability
         Max. +/-1.0 ppm / years
         Max. +/-5.0 ppm / 10 years
   4.2 Start-up time
      Max. 2.0 ms (to 90 % of output amplitude)
   4.3 Stabilization time
      Max. 2.0 ms (Within +/-0.5 ppm of final frequency)
   4.4 Harmonic distortion
      Max. -8 dBc
   4.5 Symmetry
      40 to 60 %

4.6 Phase noise

Typ. -107 dBc/Hz, Max. -102 dBc/Hz (@100 Hz offset)
Typ. -132 dBc/Hz, Max. -125 dBc/Hz (@1 kHz offset)
Typ. -147 dBc/Hz, Max. -144 dBc/Hz (@10 kHz offset)
Typ. -150 dBc/Hz, Max. -147 dBc/Hz (@100 kHz offset)
(This is tentative specification.)

4.7 Enable/Disable function

#1PAD Input	#3PAD Output
80 % V_{cc} to V_{cc}	Enable
0 V to 20 % V_{cc}	Disable

5. Reflow soldering

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

6. Marking

(1) Lot No.
(2) TJ(Type identification number)
(3) Manufacture Name(NDK symbol mark)
(4) Output frequency (MHz)
(5) Trace code

7. Inspection parameters

Para 3.1, 3.3, 3.4, 4.1.1, 6, 11.2 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.

8. 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.

9. Frequency establishment condition

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

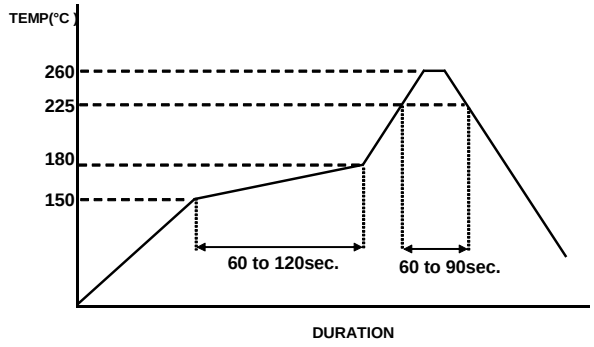
10. Washing

Not available for washing.

11. Application drawing
  11.1 Reliability assurance item
    ETS30B-00399
  11.2 Dimension of External
    ETD14B-01230C
  11.3 Packing
    ETK17B-00302A
  11.4 Land pattern
    ETD15B-00020A
  11.5 Marking
    ETH11B-00401

12. Notice
  12.1 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.
  12.2 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.
  12.3 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.
  12.4 Where any change to the process condition is made due to the change(s) in the production line, inform personnel of the specifications.
  12.5 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.
  12.6 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.
  12.7 In the company's production process whatever amount of ozone depleting substances (ODS) as specified in the Montreal protocol is not used.
  12.8 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.
  12.9 If you use resin for fixing components during manufacturing, please keep resin from adhering to the oscillator.

13. 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.

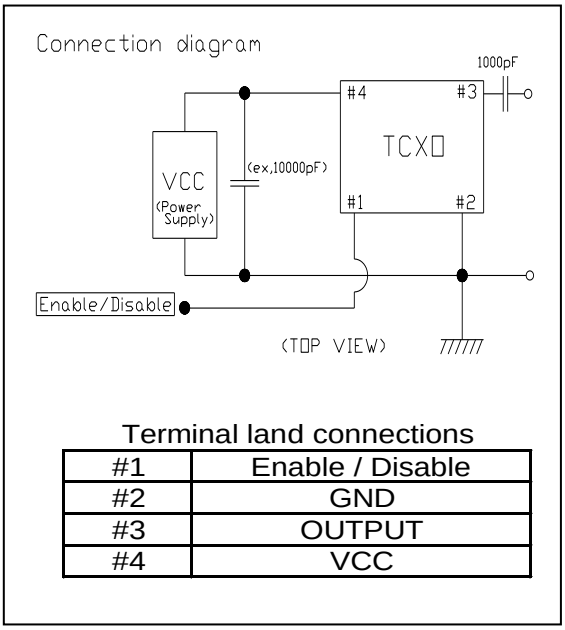


(Fig.1)

Reliability assurance item

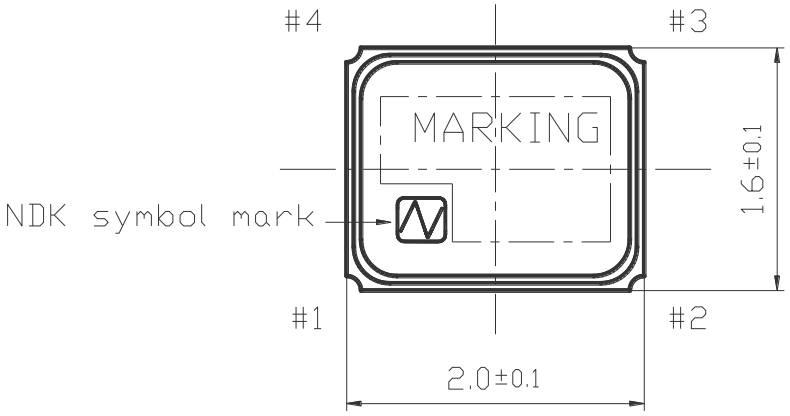
No.	Test Item	Test Methods	Specification Code
1	Vibration	5 to 26Hz: 1.52mm (total amplitude) 26 to 500Hz: 19.6m/s^2 20 minutes per 1 cycle. 2 hours for each 3 planes.	A
2	Shock	Half sine wave 6ms, 980 m/s^2. 3 times for each 3 planes.	A
3	Drop Test	Drop freely on the concrete from the height of 150cm 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

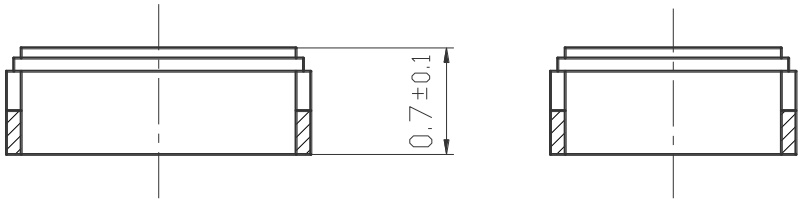
Specification code	Specification
A	After the test, shall meet electrical specification.

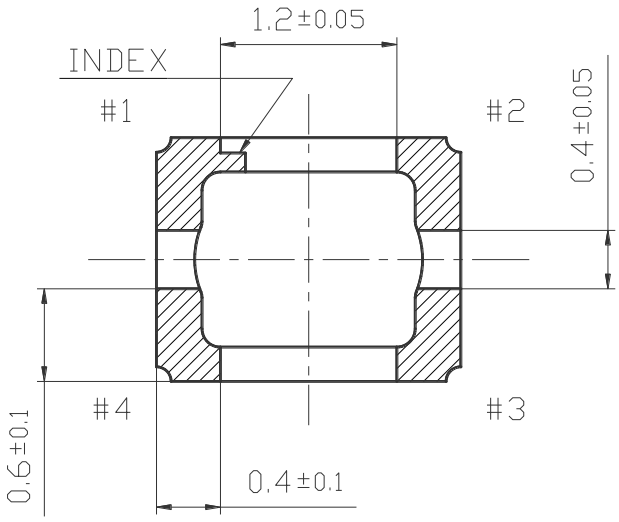


Terminal land connections

#1	Enable / Disable
#2	GND
#3	OUTPUT
#4	VCC







	Date of Revise	Charge	Approved	Reason
C	24.Oct.2013	E.Hoshi	A.Konda	change of Hatching and connection diagram (I According to EEN01A-0005)

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	18.Mar.2009	K.Yamaki	Dimension:mm	+/- 0.2	20 / 1
Designed	18.Mar.2009	Y.Kanehira	Title	Drawing No.	Rev.
Checked	18.Mar.2009	K.Moriya	**Dimension of External**	**ETD14B-01230**	C
Approved	18.Mar.2009	H.Mizumura			

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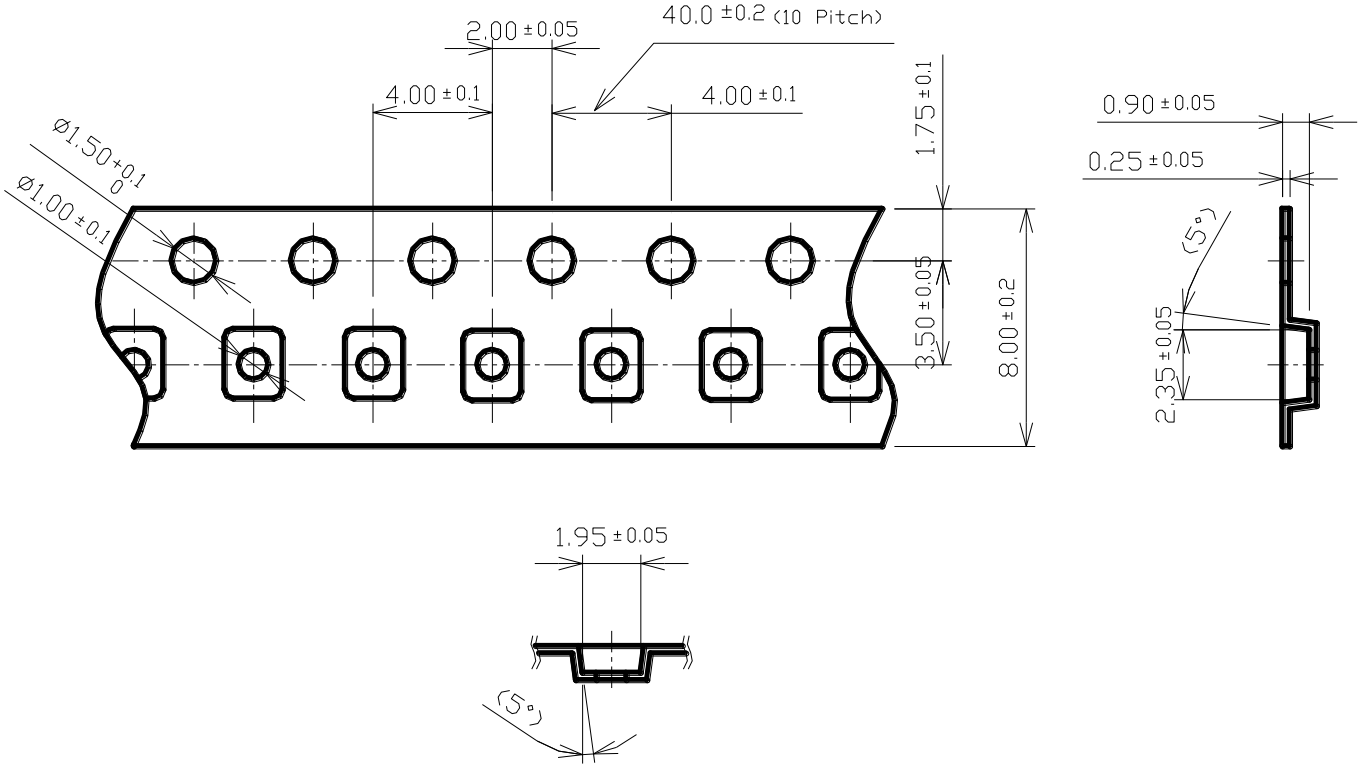

	Embossed carrier tape	Top cover tape
Materials	PS	PET + PE + Adhesive layer
Disposition	Antistatic	Antistatic

	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	**Packing**	**ETK17B-00302 (1/3)**	**A**
Approved	19.May.2010	K. Moriya			

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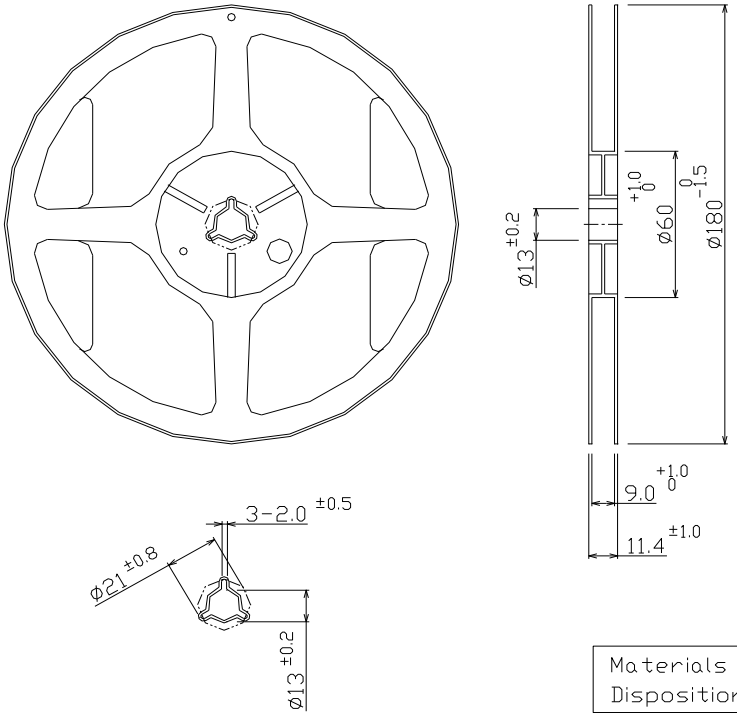
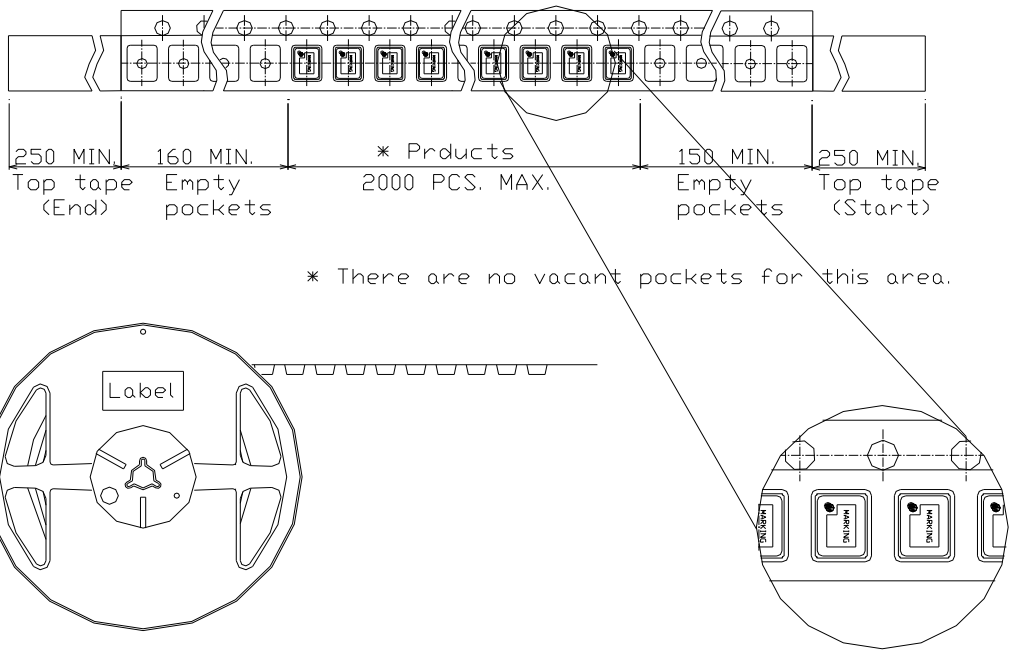
Form M-1



Materials : PS
Disposition : Antistatic



	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	**Packing**	**ETK17B-00302 (2/3)**	**A**
Approved	19.May.2010	K. Moriya			

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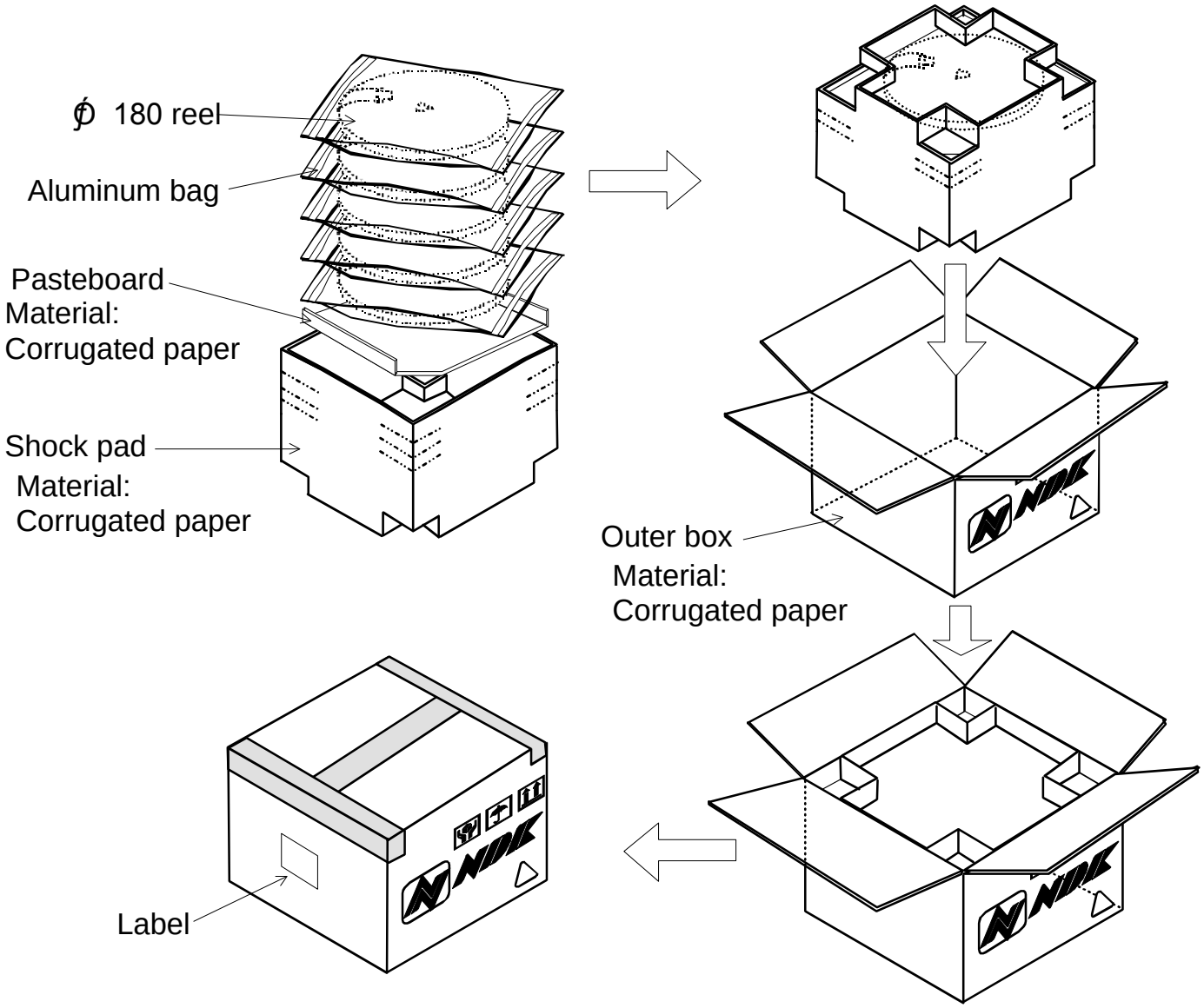
Form M-1

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



	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	**Packing**	**ETK17B-00302 (3/3)**	**A**
Approved	19.May.2010	K. Moriya			

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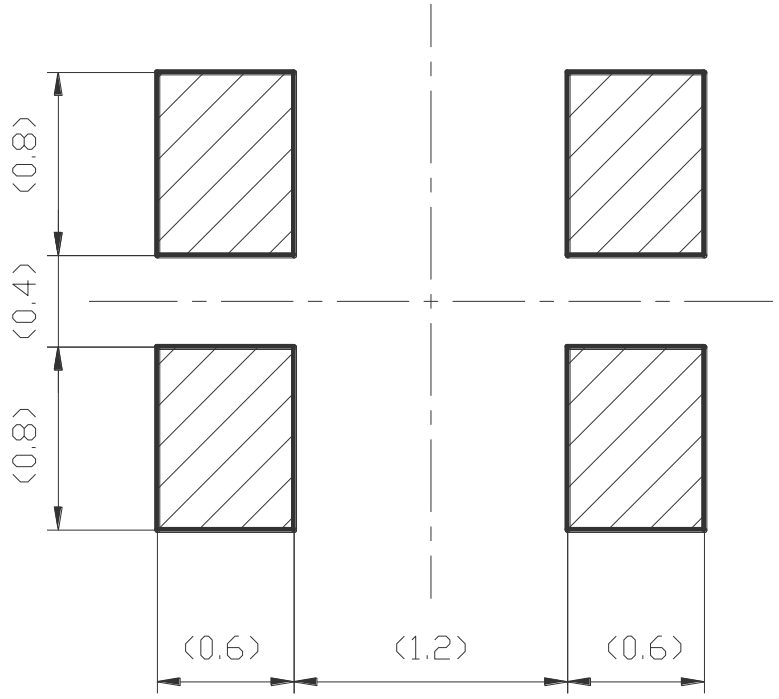
Form M-1



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	**Land pattern**	**ETD15B-00020**	A
Approved	19.Mar.2007	H.Mizumura			

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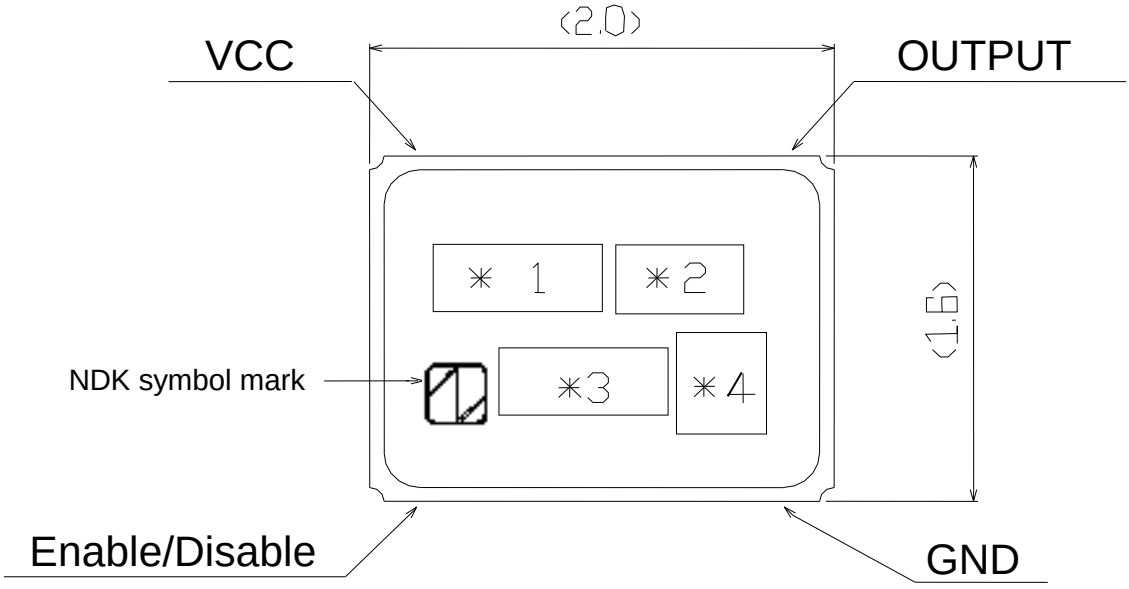

(Marking Contents)

*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.

Production Factory
<Example>
31E Sayama Factory
31E• Hakodate NDK

*2 Type identification number

*3 Output Frequency
- A unit (MHz) is not written.
- A decimal point omits.

*4 Trace code

Trace code is consisted of four digit numbers of numeral or letters.
This code indicates production date and production line number.

	Date of Revise	Charge	Approved	Reason

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	1.Dec.2011	T.Wada	Dimension:mm	---	---
Designed	1.Dec.2011	T.Wada	Title	Drawing No.	Rev.
Checked	1.Dec.2011	A.Konda	**Marking**	**ETH11B-00401**	---
Approved	1.Dec.2011	H. Mizumura			

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