



# SPECIFICATION

Customer: ELTECH COMPONENT LTD \_\_\_\_\_

|                       |                    |
|-----------------------|--------------------|
| Item:                 | CRYSTAL OSCILLATOR |
| Type:                 | NT2016SA           |
| Nominal frequency:    | 20 MHz             |
| Customer's Spec. No.: | ---                |
| NDK Spec. No.:        | END5812A           |

Receipt

| Revision Record |               |       |          |          |            |            |
|-----------------|---------------|-------|----------|----------|------------|------------|
| Rev.            | Date          | Items | Contents | Approved | Checked    | Drawn      |
| -----           | Oct. 28. 2019 | Issue | ---      | T.Hosoda | S.Kawahara | S.Kawahara |
|                 |               |       |          |          |            |            |
|                 |               |       |          |          |            |            |
|                 |               |       |          |          |            |            |
|                 |               |       |          |          |            |            |
|                 |               |       |          |          |            |            |
|                 |               |       |          |          |            |            |
|                 |               |       |          |          |            |            |
|                 |               |       |          |          |            |            |

1. Type NT2016SA

## 2. Maximum Rating

|   | Item                | Rating                             | unit |
|---|---------------------|------------------------------------|------|
| 1 | Supply Voltage      | -0.6 to +4.6                       | V    |
| 2 | Input voltage range | -0.6 to $V_{CC} + 0.6$ , Max. +4.6 | V    |
| 3 | Storage temp. range | -40 to +85                         | °C   |

## 3. Electrical specification

|    | Parameters                                | Electrical Spec. |      |       |            | Notes   |
|----|---|------------------|------|-------|------------|---|
|    |   | Min.             | Typ. | Max.  | Units      |   |
| 1  | Nominal frequency                         |                  | 20   |       | MHz        |   |
| 2  | Supply voltage ( $V_{CC}$ )               | +2.85            | +3.0 | +3.15 | 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              |      | +75   | °C         |   |
| 6  | Load impedance (resistance part)          | 9                | 10   | 11    | k $\Omega$ |   |
| 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 +75 °C<br>Based on frequency at +25+/-2 °C at control voltage ( $V_{cont}$ )=+1.5 V DC                           |
|    | 2. Frequency/Voltage coefficient          | -0.3             |      | +0.3  | ppm        | +3.0 V +/-5 %   |
|    | 3. Frequency/Load coefficient             | -0.2             |      | +0.2  | ppm        | (10 k $\Omega$ //10 pF) +/-10 %   |
|    | 4. Frequency tolerance                    | -1.5             |      | +1.5  | ppm        | at +25+/-2 °C,<br>before reflow soldering,<br>based on nominal frequency<br>at control voltage ( $V_{cont}$ )=+1.5 V DC |
|    | 5. Long-term frequency stability          | -1.0             |      | +1.0  | ppm        | year(at +25+/-2 °C)   |
| 10 | External adjustment                       |                  |      |       |            |   |
|    | 1. Control voltage ( $V_{cont}$ )         | +0.5             | +1.5 | +2.5  | V          |   |
|    | 2. Frequency control range                | -15.0            |      | -9.0  | ppm        | based on frequency<br>at ( $V_{cont}$ ) = +1.5 V DC   |
|    |   | +9.0             |      | +15.0 | ppm        |   |
|    | 3. Frequency change polarity              |                  |      |       |            | Positive  |

## 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, 3.10.2, 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

When storing the product in high temperature and high humidity condition for a long time, product characteristics(solder ability etc.) and packaging condition may be deteriorated.

The product storage deadline is 1 year after delivery in unopened state. Please use within 1 year.

If you exceed 1 year please check the product characteristics etc, please use.

Please keep the oscillator under below condition.

| MSL |             | After taking out of dry bag |
|-----|-------------|-----------------------------|
| 2   | Temperature | +30 °C max.                 |
|     | Humidity    | 60 % max.                   |
|     | Period      | 1 year max. *               |

(table)

\* 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-01331A

10.3 Packing

ETK17B-00463

10.4 Land pattern

ETD15B-00020A

10.5 Marking

ETH11B-00443B

11. Notes on use

11.1 This product cannot be used for automotive applications.

11.2 IN THE CASE OF THE FOLLOWING ITEMS, WE ARE NOT RESPONSIBLE FOR WARRANTY / COMPENSATION.

- (1) WHEN PRODUCTS OF THIS SPECIFICATION ARE USED FOR EQUIPMENT RELATED TO HUMAN LIFE OR PROPERTY, IT IS THE RESPONSIBILITY OF THE CUSTOMER TO CONFIRM THE INFLUENCE ON THIS PRODUCT AND EQUIPMENT TO BE USED BEFOREHAND, CONDUCT NECESSARY SAFETY DESIGN (INCLUDING REDUNDANT DESIGN, MALFUNCTION PREVENTION DESIGN, ETC.), PLEASE USE IT AFTER SECURING SUFFICIENT SAFETY OF EQUIPMENT.
  1. SAFETY-RELATED EQUIPMENT SUCH AS AUTOMOBILES, TRAINS, SHIPS, ETC., OR EQUIPMENT DIRECTLY INVOLVED IN OPERATION
  2. AIRCRAFT EQUIPMENT
  3. SPACE EQUIPMENT
  4. MEDICAL EQUIPMENT
  5. MILITARY EQUIPMENT
  6. DISASTER PREVENTION / CRIME PREVENTION EQUIPMENT
  7. TRAFFIC LIGHT
  8. OTHER EQUIPMENT REQUIRING THE SAME PERFORMANCE AS THE ABOVE-MENTIONED EQUIPMENT
- (2) IN CASES WHERE IT IS NOT INDICATED IN THE REQUESTED STANDARD AND IS USED UNDER CONDITIONS OF USE (INCLUDING CIRCUIT MARGIN ETC.) THAT CANNOT BE PREDICTED AT THE PRODUCTION STAGE.
- (3) WHEN USING ULTRASONIC WELDING MACHINE. (THERE IS A POSSIBILITY THAT THE CHARACTERISTIC DEGRADATION IS CAUSED BY THE RESONANCE PHENOMENON OF THE CRYSTAL PIECE.)
- (4) USING RESIN MOLD MAY AFFECT THE PRODUCT CHARACTERISTIC. PLEASE MAKE SURE TO TELL OUR SALES CONTACT WHEN YOU USE RESIN MOLD. WE WILL PERFORM INDIVIDUAL CORRESPONDENCE ABOUT A DELIVERY SPECIFICATION AND A EVALUATION METHOD.  
IN ADDITION, IF YOU USE RESIN MOLD WITHOUT CONTACTING US, AND CAUSES DAMAGES AGAINST A CUSTOMER OR A THIRD PARTY, WE WILL NOT BE LIABLE FOR THE DAMAGES AND OTHER RESPONSIBILITIES BECAUSE WE CONSIDER IT IS UNDER SELF-RESPONSIBILITY USING RESIN MOLD.
  - WE WILL NOT TAKE ANY RESPONSIBILITY FOR THE INFLUENCE OF THE CUSTOMERS' PROCESS.  
PLEASE EFFICIENTLY EVALUATE AT A SAMPLE STEP WHEN YOU USE RESIN MOLD.
- (5) OPERATION IN HIGH HUMIDITY OR CONDENSATION CONDITIONS WILL AFFECT THE CHARACTERISTICS. IF SUCH ENVIRONMENT USE, PLEASE TAKE MEASURES AGAINST WATERPROOF.
- (6) WHEN PERFORMING IMPROPER HANDLING THAT EXCEEDS THE GUARANTEED RANGE.

11.3 Even if the appearance color etc. of the product differs by purchasing the component parts by more than two companies, there is no influence on the characteristics and reliability.

12. Other Requests

12.1 Please use this specification only for confirmation of the specification of this product.

12.2 If there is a change request, please contact within three weeks from issue date. If there is no communication, we will deliver the product under the contents of this specification.

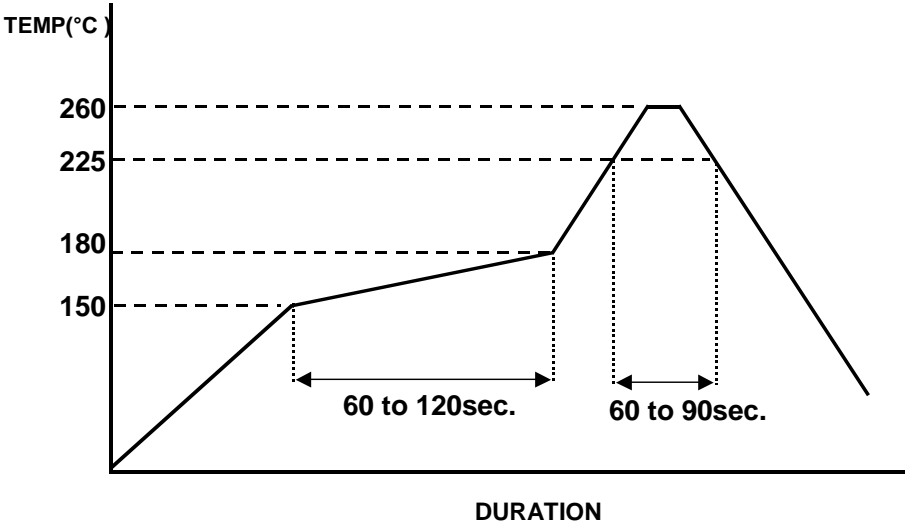
In addition, if the product delivery date is within 3 weeks and there is a change request, we will consult the processing separately.

12.3 NOTES THAT ARE DESCRIBED IN THIS DOCUMENT, IF YOU DID NOT COMPLY WITH THE PROHIBITIONS, AND OTHER PLEASE, INCLUDING THE FAILURE CORRESPONDENCE OR COMPENSATION OR DAMAGES, WE CANNOT ASSUME THE RESPONSIBILITY, PLEASE UNDERSTAND.

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 +350 +/-5 °C on the terminal electrode for 3+/-1 seconds.
- (3) Hot air heat resistance  
Blow hot air of +350 +/-5 °C on the product for 3+/-1 seconds.



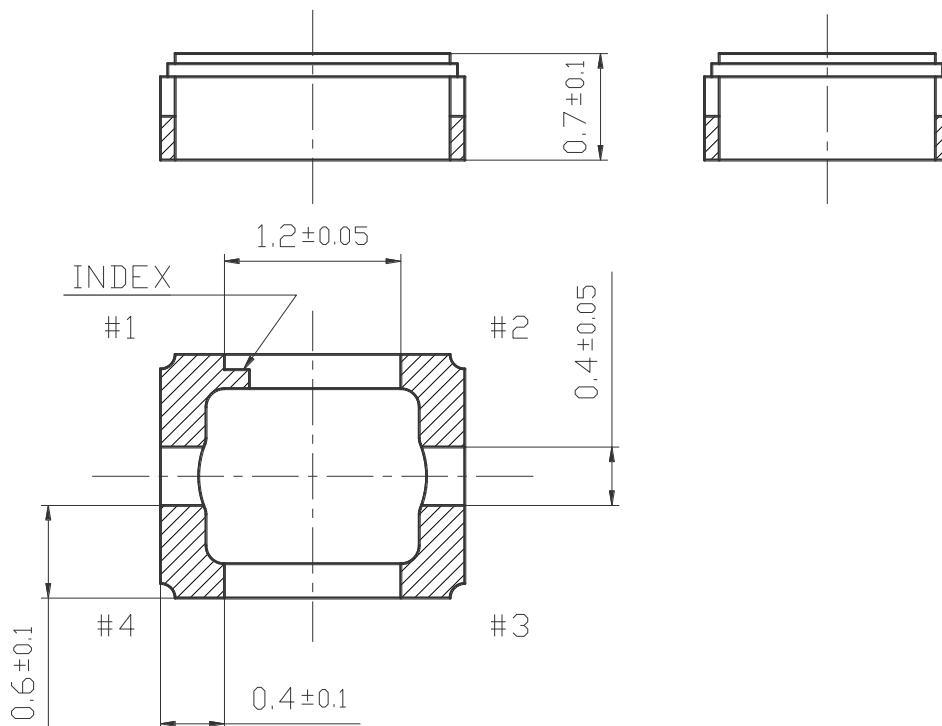
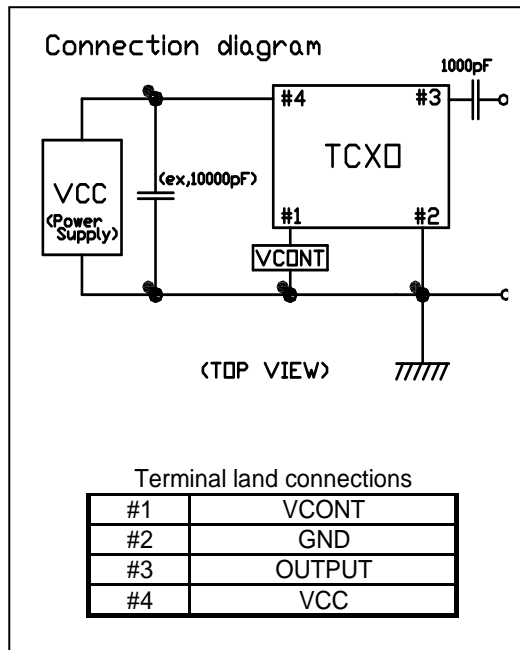
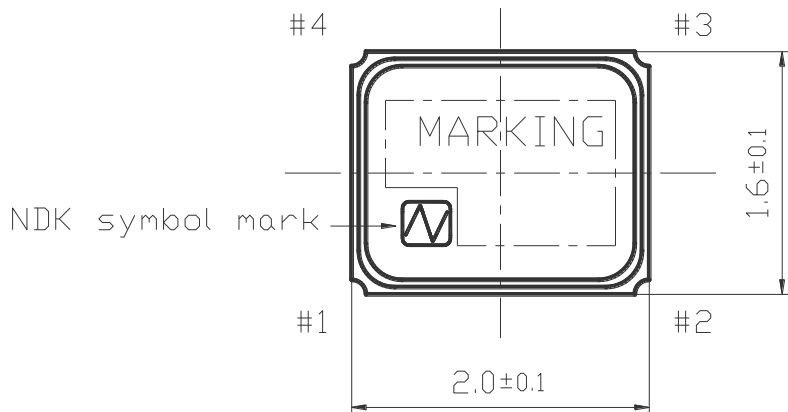
(Fig.1)

**Reliability assurance item**

(page: 1/1)

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

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

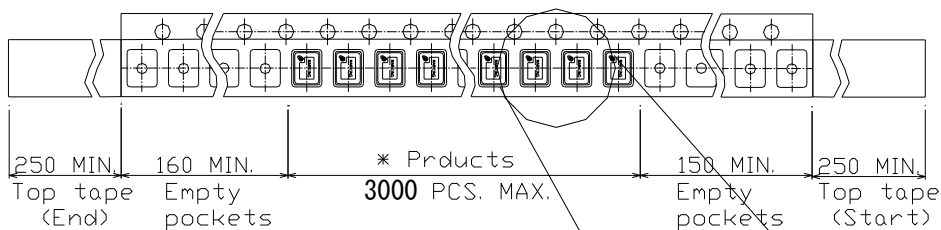
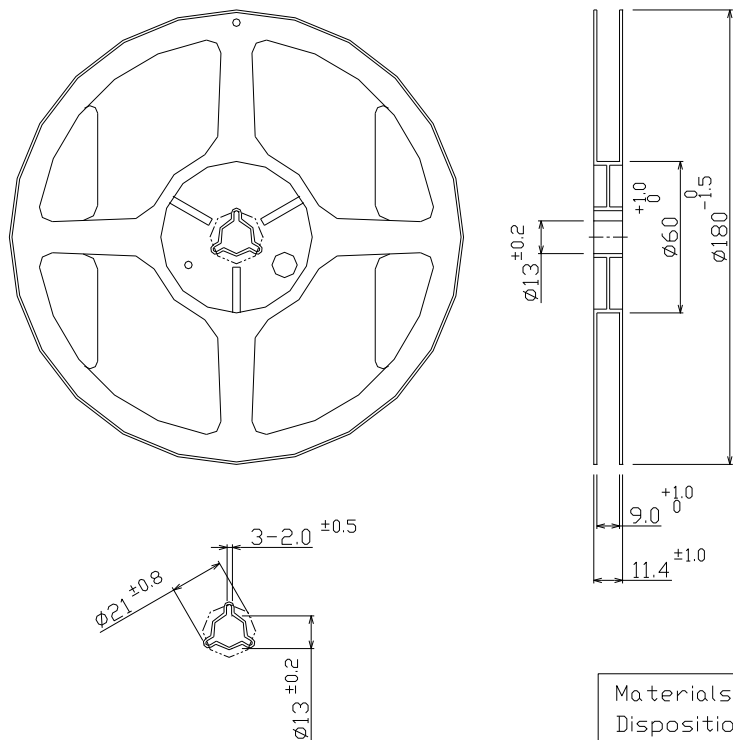


|          | Date of Revise | Charge        | Approved                     | Reason  |          |
|----------|----------------|---------------|------------------------------|---|----------|
| A        | 24.Oct.2013    | E.Hoshi       | A.Konda                      | change of Hatching and connection diagram<br>(I According to EEN01A-0005) |          |
|          | Date           | Name          | Third Angle Projection       | Tolerance   | Scale    |
| Drawn    | 19.Oct.2009    | M.Kashiwamura | Dimension:mm                 | +/- 0.2   | 20 / 1   |
| Designed | 19.Oct.2009    | Y.Kanehira    | Title                        | Drawing No.   | Rev.     |
| Checked  | 19.Oct.2009    | K.Moriya      |                              |   |          |
| Approved | 19.Oct.2009    | K.Moriya      |                              |   |          |
|          |                |               | <b>Dimension of External</b> | <b>ETD14B-01331</b>   | <b>A</b> |

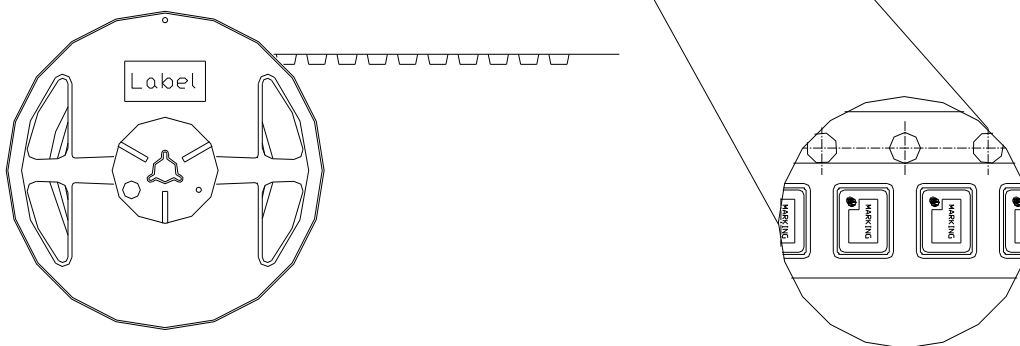
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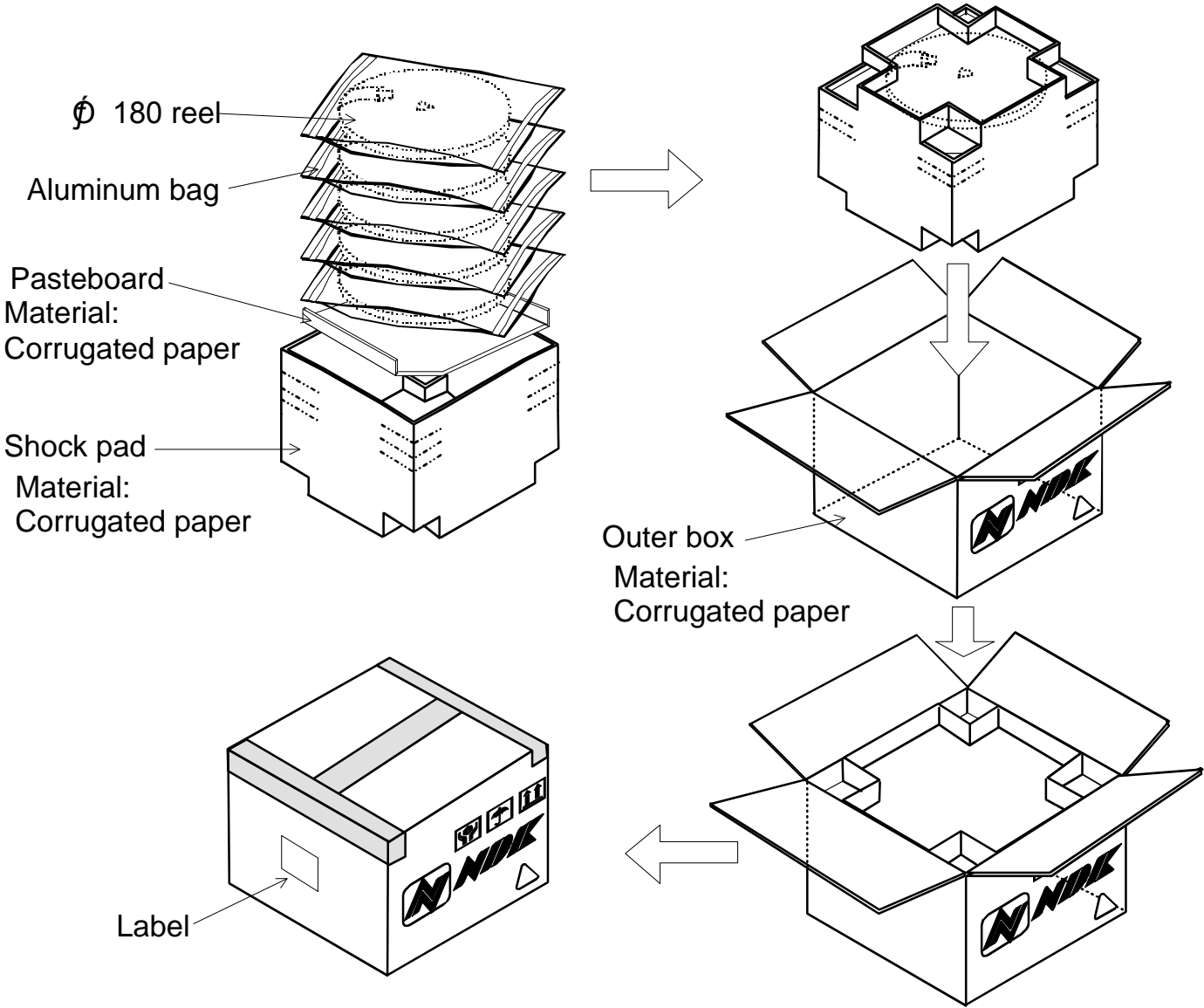
\* There are no vacant pockets for this area.



| Date of Revise |              | Charge     | Approved               | Reason      |                |
|----------------|--------------|------------|------------------------|-------------|----------------|
| Drawn          | 9. Nov. 2016 | E.Hoshi    | Third Angle Projection | Tolerance   | Scale          |
| Designed       | 9. Nov. 2016 | E.Hoshi    | Dimension:mm           | -----       | -----          |
| Checked        | 9. Nov. 2016 | M.Fukunaga | Title                  | Drawing No. | Rev.           |
| Approved       | 9. Nov. 2016 | M.Fukunaga |                        |             | <b>Packing</b> |

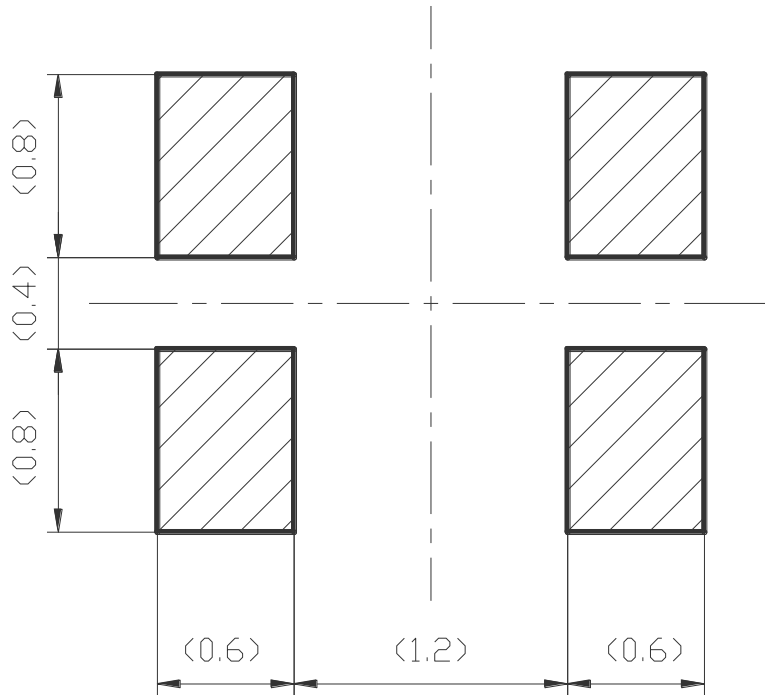
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-3000pcs.Max./Reel  
 -5 Reels Max./Carton



|                |                |            |                           |             |          |
|----------------|----------------|------------|---------------------------|-------------|----------|
|                | Date of Revise | Charge     | Approved                  | Reason      |          |
|                |                |            |                           |             |          |
|                | Date           | Name       | Third Angle Projection    | Tolerance   | Scale    |
| Drawn          | 9. Nov. 2016   | E.Hoshi    | Dimension:mm              | ----        | ----     |
| Designed       | 9. Nov. 2016   | E.Hoshi    | Title                     | Drawing No. | Rev.     |
| Checked        | 9. Nov. 2016   | M.Fukunaga |                           |             | -        |
| Approved       | 9. Nov. 2016   | M.Fukunaga |                           |             |          |
| <b>Packing</b> |                |            | <b>ETK17B-00463 (3/3)</b> |             | <b>-</b> |

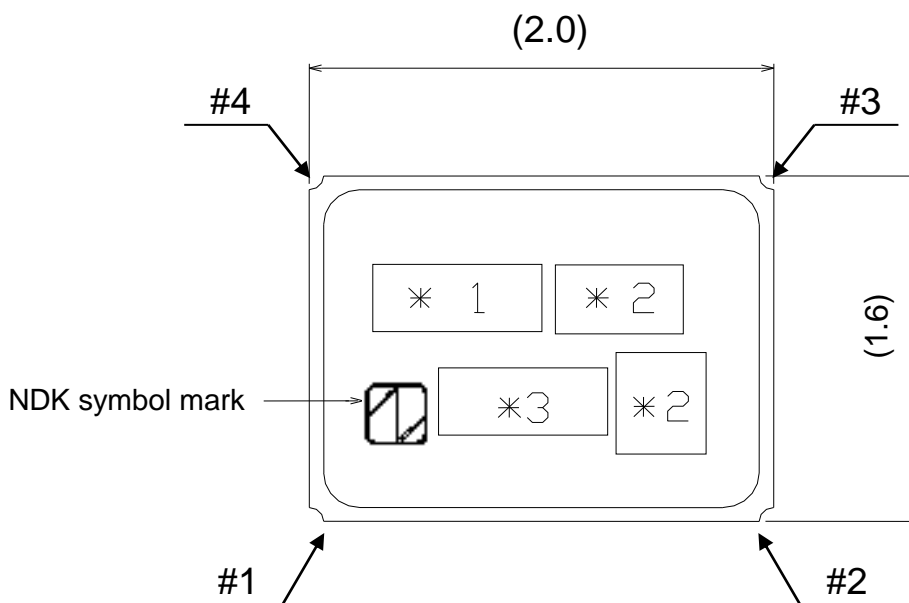
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Note) Please reserve a large ground pattern on the PCB where the oscillator is installed.

|          |                |            |                        |                     |          |
|----------|----------------|------------|------------------------|---------------------|----------|
|          | 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 |                        |                     |          |
|          |                |            | <b>Land pattern</b>    | <b>ETD15B-00020</b> | <b>A</b> |

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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 |                        |                           | Marking | ETH11B-00443 | B |
| Approved | 16. Apr. 2013  | K.Moriya      |                        |                           |         |              |   |

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