Crystal Bridge to the Future

Temperature Compensated Crystal Oscillator

■NT5032BA Data Sheet

High-Precision TCXO

RoHS Compliant
Directive 2011/65/EU
Directive (EU) 2015/863

Pb free

Halogen free

Applications

- STRATUM3 compatible devices
- Base Station
- Backbone Network Equipment

Features

- Output specifications: CMOS
- Low current consumption: Max.8.0 mA
- Dimensions: 5.0 × 3.2 mm, Height: 1.8 mm
  Uses a small package
- With Enable / Disable function.

1. Item : Temperature compensated crystal oscillator (TCXO)

2. Type : NT5032BA

3. Nominal Frequency : 12.800 MHz

4. NDK Spec. No. : RNA5030A

5. NDK Parts No. : RNA5030A-12.8M

6. Maximum Rating

	Item	Rating	unit
1	Supply Voltage	-0.6 to +4.6	V
2	Storage Temperature Range	-40 to +85	°C

7. Rating

	Item	Rating				Notes
		Min.	Typ.	Max.	Units	
1	Nominal Frequency		12.800		MHz	
2	Supply Voltage (V_{CC})	+3.135	+3.3	+3.465	V	(-Earth)
3	Operating Temp. Range	-40		+85	°C	
4	Load Impedance (Capacity)	13.5	15	16.5	pF	

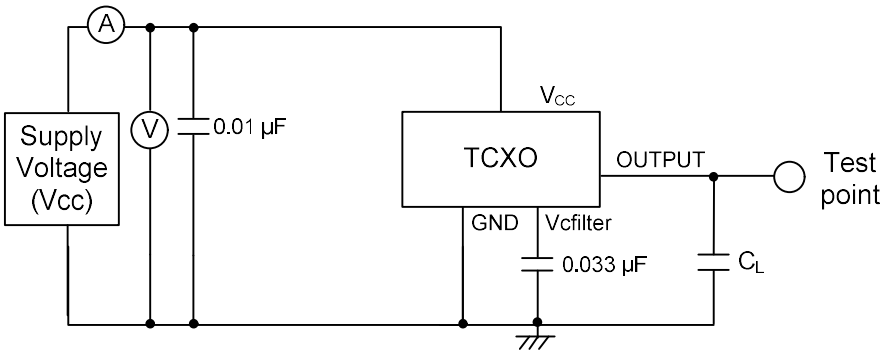
8. Electrical Specification

Unless otherwise specified, measuring condition T = +25±2 °C, V_{CC} =+3.3 V, Load =15pF

	Parameters	Electrical Spec.				Notes
		Min.	Typ.	Max.	Units	
1	Current Consumption			6	mA	
2	Frequency Stability					
	1. Overall Frequency Tolerance	-4.6		+4.6	ppm	Total of Para. 4.2.2 to 4.2.6
	2. Frequency / Temperature Characteristics	-0.28		+0.28	ppm	-40 to +85 °C Frequency shift from the reference frequency at (Fmax + Fmin)/2.
	3. Frequency/ Voltage Coefficient	-0.1		+0.1	ppm	+3.3 V ±5 % (at +25 ±2 °C)
	4. Frequency / Load coefficient	-0.2		+0.2	ppm	15 pF ±10 %
	5. Frequency Tolerance	-0.7		+0.7	ppm	At shipping, based on nominal frequency
	6. Long-term Frequency Stability	-1.0		+1.0	ppm	Year
		-3.0		+3.0	ppm	20 years
						at +25 ±2 °C
3	Output	CMOS				
	1. Output Voltage (Square)			10 % V_{CC}	V	V_{OL}
		90 % V_{CC}			V	V_{OH}
	2. Symmetry	45	50	55	%	50 % V_{CC}
	3. Rise Time (t_r)			8	ns	10 % to 90 % V_{CC}
	4. Fall Time (t_f)			8	ns	90 % to 10 % V_{CC}

	Item	Rating				Notes
		Min.	Typ.	Max.	Units	
4	Phase Noise		-104		dBc/Hz	10 Hz offset
			-128		dBc/Hz	100 Hz offset
			-147		dBc/Hz	1 kHz offset
			-158		dBc/Hz	10 kHz offset
			-160		dBc/Hz	100 kHz offset
						at +25 ±2 °C

9. Test Circuit



C_L including capacitance of probe and jig

Fig. 1 Test Circuit

10. Mounted Conditions

Reflow solder mounting is recommended. The temperature profile is as follows.
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: 260 °C /10 s

Heating: +225 °C or higher, 30 s

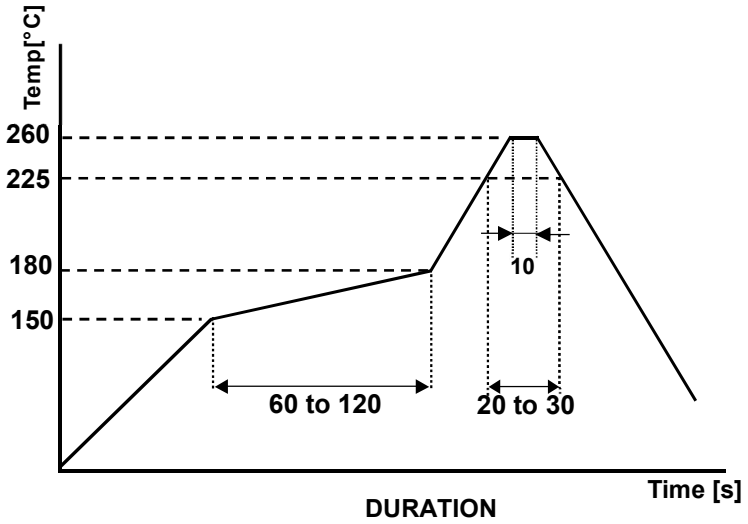
Preheat: 150 °C to 180 °C /120 s

Number of reflow passes: 2 times

(2) Iron heat resistance

Apply iron of 350 °C on the product for 5 s. (2 times)

Reflow Temperature Profile



11. Washing
Not available for washing.

12. Environmental Conditions

	Item	Condition	Specification
8.1	Vibration Test	IEC60068-2-6, test Fc 10 to 500 Hz, 98.1 m/s^2, 2 hours, 3 directions.	After following test, Complies with all items of electrical characteristic specification.
8.2	Shock Test	IEC60068-2-27, test Ea 981 m/s^2,6 ms, Half Sine, 3 bumps, 6 directions.	

13. 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 6 months after delivery in unopened state. Please use within 6 months.
If you exceed 6 months please check the product characteristics etc, please use.
Please keep the oscillator under below condition.

MSL		Before taking out of dry bag	After taking out of dry bag
3	Temperature	+5 °C to +45 °C	Max.+30 °C
	Humidity	10 % to 75 %	Max.60 %
	Period	6 months	168 hours

(table)

14. Application drawing
14.1 Dimension of External
ETD14B-02409
14.2 Packing
ETK17B-00437A
14.3 Marking
ETH11B-00598A

15. Notes On Use

15.1 This product cannot be used for automotive applications.

15.2 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.

15.3 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.), AND 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, EFFECT OF HEAT GENERATION OF PARTS USED 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 PIEZOELECTORIC MATERIAL.
(EXAMPLE; CRYSTAL PIECE))
WE WILL NOT TAKE ANY RESPONSIBILITY FOR THE INFLUENCE OF THE CUSTOMERS' PROCESS.
SO, PLEASE SUFFICIENTLY EVALUATE AT A SAMPLE STEP WHEN YOU USE ULTRASONIC WELDING MACHINE.

(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 using this product, please insert a bypass capacitor between the power supply and GND.
(Closer to the product terminal is desirable.)
The bypass capacitor values shown in our specifications and drawings are for reference only.
(They are not guaranteed values.)
In actual use, please select the appropriate bypass capacitor value for your circuit.
NDK shall not be liable for any and all events resulting from or in connection with the use of this product in a manner that does not comply with the above instruction.

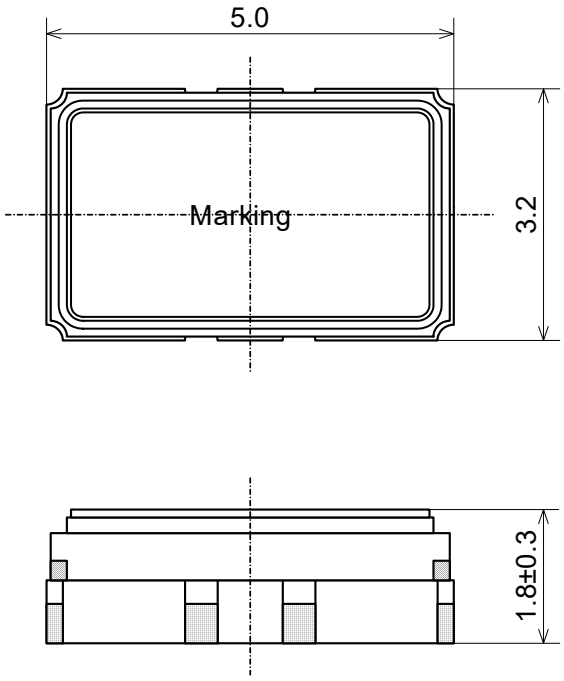
(7) WHEN PERFORMING IMPROPER HANDLING THAT EXCEEDS THE GUARANTEED RANGE.

16. Other Requests

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

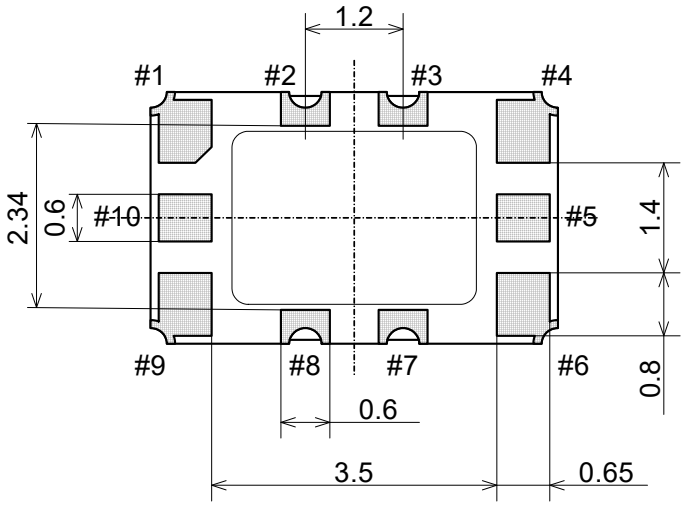
16.2. If there is a change request, please contact within three weeks from issue date. If there is no communication, we will deliver the product under the contents of this specification. In addition, if the product delivery date is within 3 weeks and there is a change request, we will consult the processing separately.

16.3. 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 CAN NOT ASSUME THE RESPONSIBILITY, PLEASE UNDERSTAND.

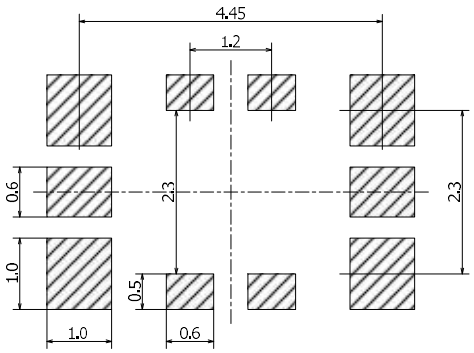


Terminal Land Connections

#1	Do not Connect
#2	Do not Connect
#3	Do not Connect
#4	GND
#5	NC
#6	OUTPUT
#7	Vcfilter
#8	Do not Connect
#9	V_{CC}
#10	NC



Land Pattern (Recommended)



(Note)

1. Please connect the bypass capacitor (for example: 0.01 μF) near the V_{cc} terminal.
2. Do not connect terminal nothing should connect.
3. Please connect a capacitor (0.033 μF) near the Vcfilter terminal.

	Date of Revise	Charge	Approved	Reason

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	17. Nov. 2021	M. Fukunaga	Dimension: mm	±0.2	---
Designed	17. Nov. 2021	M. Fukunaga	Title	Drawing No.	Rev.
Checked	17. Nov. 2021	Y. Sato	**External Dimension**	**ETD14B-02409**	**-**
Approved	17. Nov. 2021	T. Hosoda			

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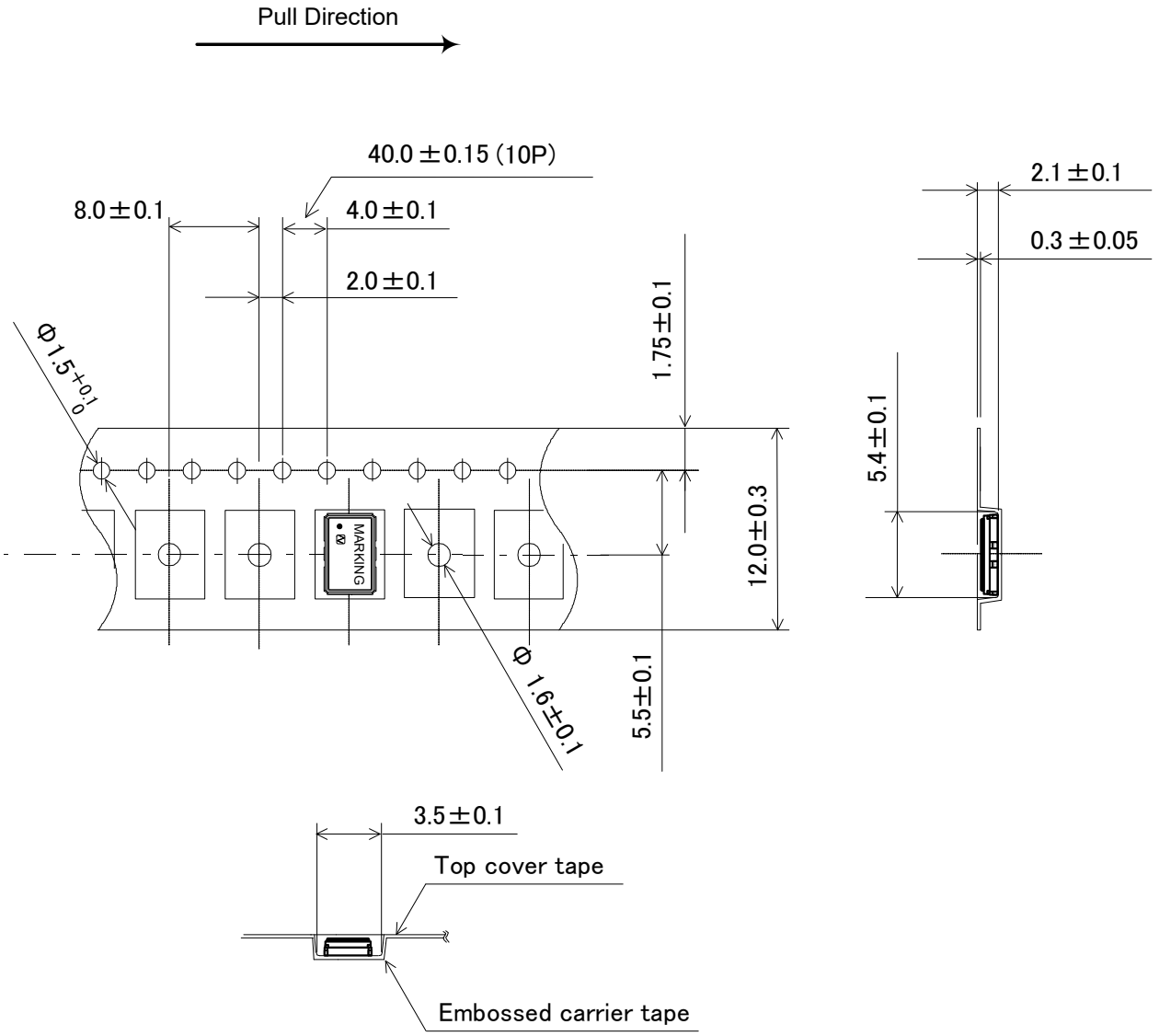

	Embossed carrier tape	Top cover tape
Materials	PS	PET+PE+Adhesive layer
Disposition	Antistatic	Antistatic

	Date of Revise	Charge	Approved	Reason
A	22. Aug. 2022	M. Fukunaga	T. Abe	Pull Direction add

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	16.May.2016	A. Nakamura	Dimension: mm	---	---
Designed	16.May.2016	A. Nakamura	Title	Drawing No.	Rev.
Checked	16.May.2016	N. Sekine	**Packing**	**ETK17B-00437 (1/4)**	A
Approved	16.May.2016	T. Matsumoto			

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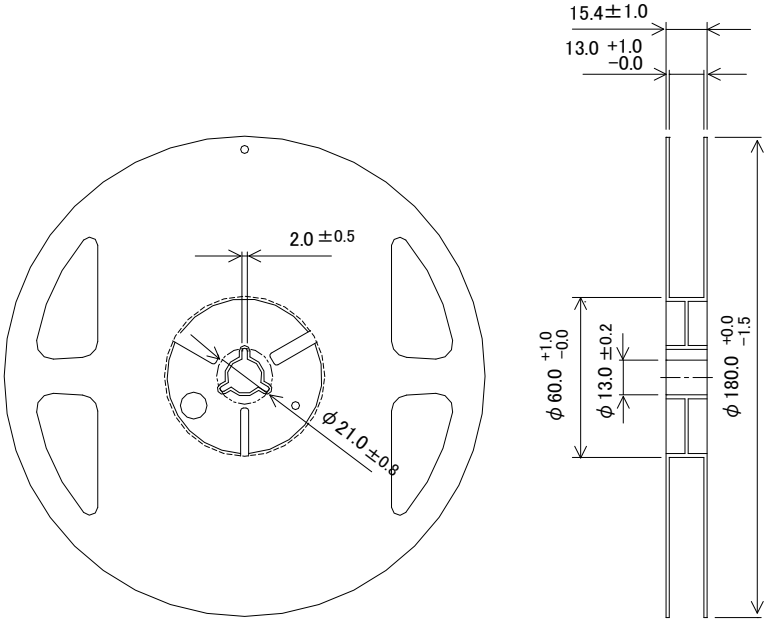
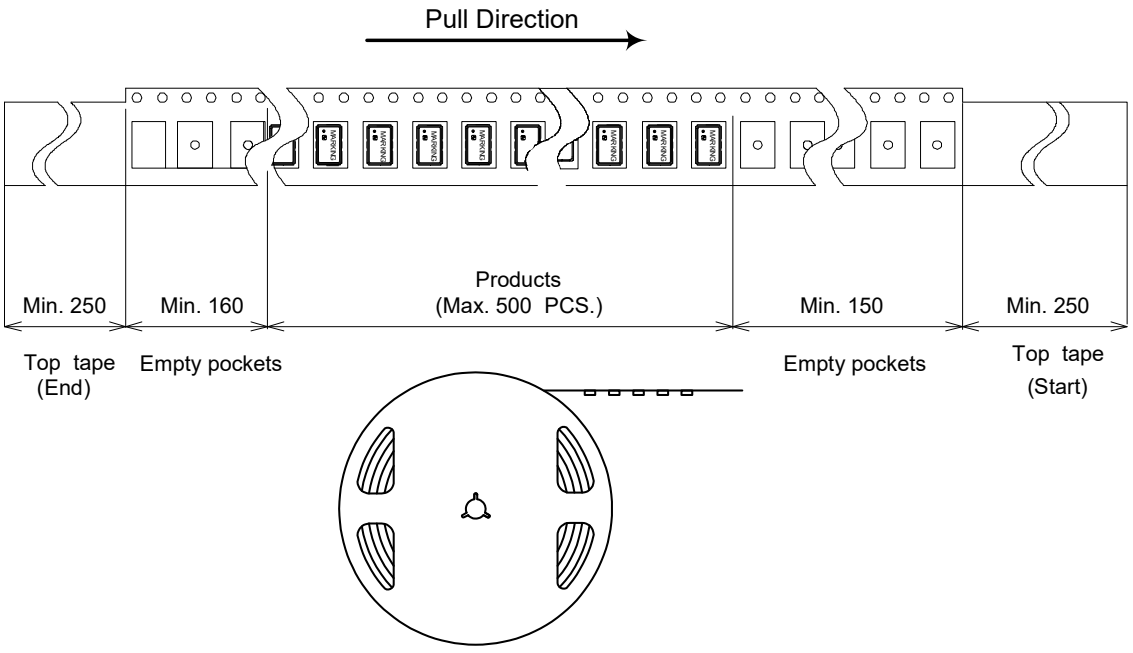


Materials : PS+Carbon
Disposition : Conductive



	Date of Revise	Charge	Approved	Reason
A	22. Aug. 2022	M. Fukunaga	T. Abe	Pull Direction add

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	16.May.2016	A. Nakamura	Dimension: mm	---	---
Designed	16.May.2016	A. Nakamura	Title	Drawing No.	Rev.
Checked	16.May.2016	N. Sekine	**Packing**	**ETK17B-00437 (2/4)**	A
Approved	16.May.2016	T. Matsumoto			

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Tape break force, peel strength and angle

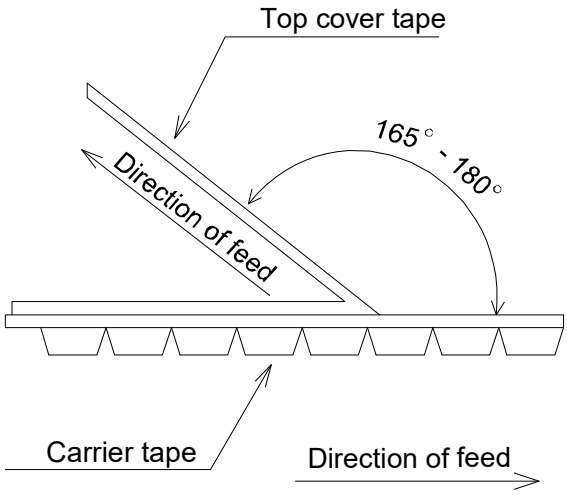
Required setting:

Tape break force: Min 10 N

Top cover tape strength: Min 10 N

Top cover tape peel force : 0.1-1.3 N(0.1-1.0 for 8 mm carrier tapes), at a peel speed of 300 +/-10 mm/min.

Angle between the top cover tape and the direction of feed during peel off.
165-180°



The cover tapes not extend over the edge of the carrier tape or cover any part of the sprocket holes.

	Date of Revise	Charge	Approved	Reason
A	22. Aug. 2022	M. Fukunaga	T. Abe	Pull Direction add

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	16.May.2016	A. Nakamura	Dimension: mm	---	---
Designed	16.May.2016	A. Nakamura	Title	Drawing No.	Rev.
Checked	16.May.2016	N. Sekine	**Packing**	**ETK17B-00437 (3/4)**	A
Approved	16.May.2016	T. Matsumoto			

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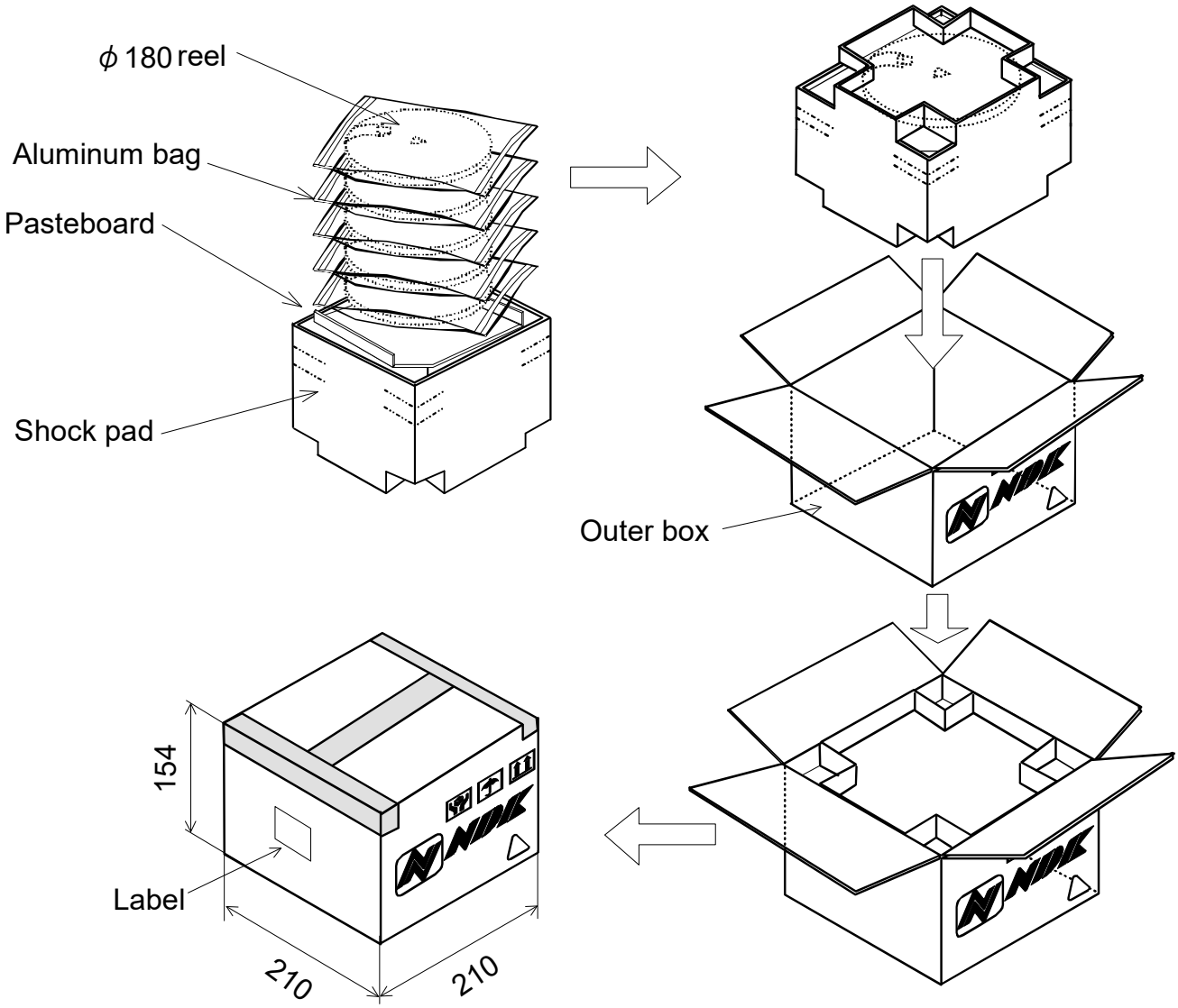

	Date of Revise	Charge	Approved	Reason
A	22. Aug. 2022	M. Fukunaga	T. Abe	Pull Direction add

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	16.May.2016	A. Nakamura	Dimension: mm	---	---
Designed	16.May.2016	A. Nakamura	Title	Drawing No.	Rev.
Checked	16.May.2016	N. Sekine	**Packing**	**ETK17B-00437 (4/4)**	A
Approved	16.May.2016	T. Matsumoto			

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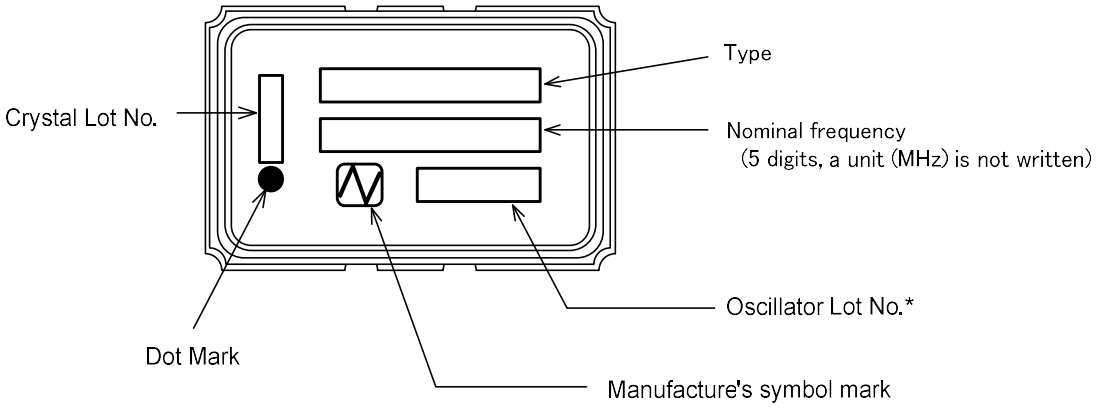
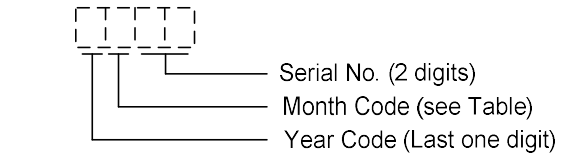


* Oscillator Lot No.



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

	Date of Revise	Charge	Approved	Reason
A	11.Jan.2022	Y. Sato	T. Hosoda	Correction of figure

	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	17.Aug.2016	A. Nakamura	Dimension: mm	-	-
Designed	17.Aug.2016	A. Nakamura	Title	Drawing No.	Rev.
Checked	17.Aug.2016	N. Sekine	**Marking Drawing**	**ETH11B-00598**	A
Approved	17.Aug.2016	T. Matsumoto			

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