



# SPECIFICATION

Customer: ELTECH - TOPCON

Item: Quartz Crystal Controlled Oscillators

Type: NT7050BC

Nominal Frequency: 20.000 MHz

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

NDK Spec. No.: END5414A

Receipt
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Revision Record						
Rev.	Date	Items	Contents	Approved	Checked	Drawn
---	28.Jul.2017	Issue	---	Y.Sato	H.Nagaushi	N.Sekine

1. Customer's Spec. No. : -----
2. NDK Spec. No. : END5414A
3. Type : NT7050BC
4. External Dimension : ETD14B-01907
5. Rating
- 5.1 Nominal Frequency ( $f_{nom}$ )  
20.000 MHz
- 5.2 Supply Voltage ( $V_{CC}$ )  
DC+3.0 V $\pm$ 5 %
- 5.3 Control Voltage ( $V_{cont}$ )  
DC+1.5 V $\pm$ 1.0 V
- 5.4 Output Load Condition ( $C_L$ )  
15 pF $\pm$ 10 %
- 5.5 Operating Temperature Range ( $T_{opr}$ )  
-40 °C to +85 °C
- 5.6 Storage Temperature Range ( $T_{str}$ )  
-55 °C to +125 °C

## 6. Electrical Specification

Unless otherwise specified, measuring condition  $T = +25\pm 2$  °C,  $V_{CC} = +3.0$  V,  $V_{cont} = +1.5$  V,  $C_L = 15$  pF.

	Item	Symbol	Condition	Spec. Value		Unit
				Min.	Max.	
6.1	Current Consumption	$I_{CC}$	-	-	5	mA
6.2	Frequency					
6.2.1	Frequency Tolerance	$\Delta f/f_{nom}$	(*1), (*2)	-1.0	+1.0	ppm
6.2.2	Frequency/Temperature Characteristics	$\Delta f/f$	-40 °C to +85 °C, (*3)	-0.5	+0.5	ppm
6.2.3	Frequency/Temperature Slope	$\Delta f/f$		-50	+50	ppb/°C
6.2.4	Frequency/Voltage Coefficient	$\Delta f/f$	DC+3.0 V $\pm$ 5 % (*4)	-0.05	+0.05	ppm
6.2.5	Frequency/Load Coefficient	$\Delta f/f$	15 pF $\pm$ 10 % (*4)	-0.05	+0.05	ppm
6.2.6	Long-Term Frequency Stability	$\Delta f/f$	1 year (*5)	-1.0	+1.0	ppm
6.2.7	Short-Term Frequency Stability (ADEV)	$\Delta f/f$	Tau = 1 s	---	+1.0	$\times 10^{-10}$
6.3	Output					
6.3.1	Output Voltage (Square)	$V_{OH}$	-	90 % $V_{CC}$	-	V
		$V_{OL}$	-	-	10 % $V_{CC}$	V
6.3.2	Symmetry	SYM	50 % $V_{CC}$	45	55	%
6.3.3	Rise Time	$t_r$	10 % to 90 % $V_{CC}$	-	8	ns
6.3.4	Fall Time	$t_f$	90 % to 10 % $V_{CC}$	-	8	ns

	Item	Symbol	Condition	Spec. Value		Unit
				Min.	Max.	
6.4	Frequency Controlled Characteristics					
	6.4.1 Frequency Control Range	$\Delta f/f$	$V_{cont}=+0.5\text{ V}$ (*4)	-10	-5	ppm
			$V_{cont}=+2.5\text{ V}$ (*4)	+5	+10	ppm
	6.4.2 Input Impedance	$Z_{in}$	-	100	-	k $\Omega$
6.4.3 Frequency Change Polarity	-	-	Positive		-	
6.5	Phase Noise		100 Hz offset	Typ. -123		dBc/Hz
			1 kHz offset	Typ. -145		dBc/Hz
			10 kHz offset	Typ. -153		dBc/Hz
			100 kHz offset	Typ. -155		dBc/Hz
			1 MHz offset	Typ. -157		dBc/Hz
6.6	Enable/Disable Function	Open or Min. 70 % $V_{CC}$		Enable		
		Max. 30 % $V_{CC}$		Disable		

(\*1)  $\Delta f/f_{nom}$ : Frequency shift at  $T = +25\pm 2\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +3.0\text{ V}$ ,  $V_{cont} = +1.5\text{ V}$ ,  $C_L = 15\text{ pF}$  from nominal frequency ( $f_{nom}$ ).

(\*2) Including 2 times reflow.

(\*3)  $\Delta f/f$ : reference frequency to  $(F_{max} + F_{min}) / 2$ .

(\*4)  $\Delta f/f$ : Frequency shift from the reference frequency at  $T = +25\pm 2\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +3.0\text{ V}$ ,  $V_{cont} = +1.5\text{ V}$ ,  $C_L = 15\text{ pF}$ .

(\*5)  $\Delta f/f$ : Frequency shift from the reference frequency at  $T = +25\pm 2\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +3.0\text{ V}$ ,  $V_{cont} = +1.5\text{ V}$ ,  $C_L = 15\text{ pF}$ , after 24 h of operation.

## 7. Environmental Conditions

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

## 8. Marking

Type

Nominal Frequency (MHz is not written)

NDK Symbol Mark

Lot No.

Dot Mark

## 9. Moisture Sensitivity Level

Level 3 (Compliant with J-STD-020)

## 10. Packing

ETK17B-00436

## 11. Notice

10.1 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.

10.2 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.

10.3 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.

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

10.5 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.

10.6 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.

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

10.8 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.

10.9 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.

10.10 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.

#### 11. 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: 260°C, 10 sec

Heating: 225°C or higher, 30 sec

Preheating: 150°C to 180°C, 120 sec

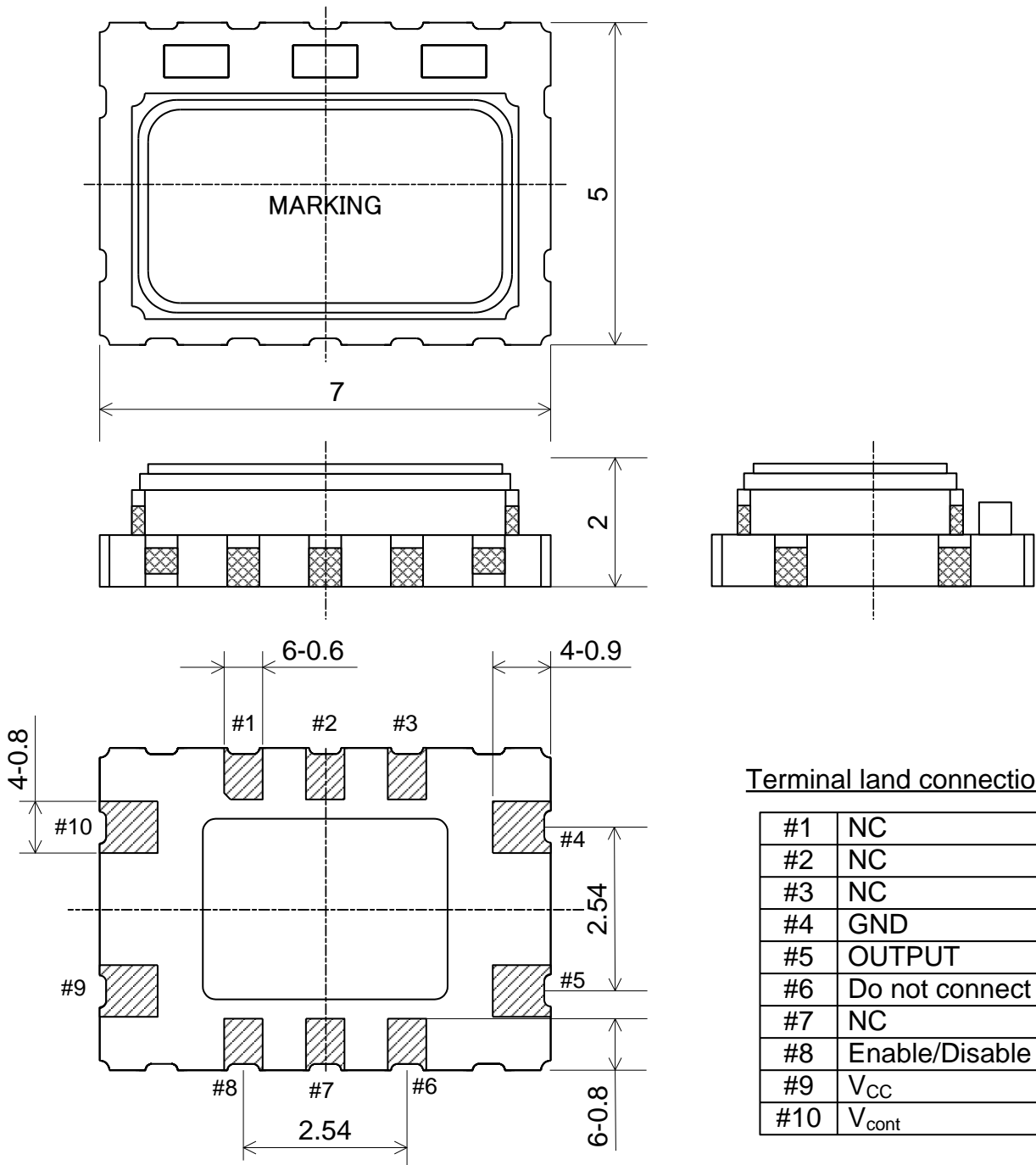
Reflow passage times: twice

##### (2) Manual soldering heat resistance

Pressing a soldering iron of 350°C on the terminal electrode for four seconds (twice).

##### (3) Washing

This product does not correspond to rinsing.



**Terminal land connections**

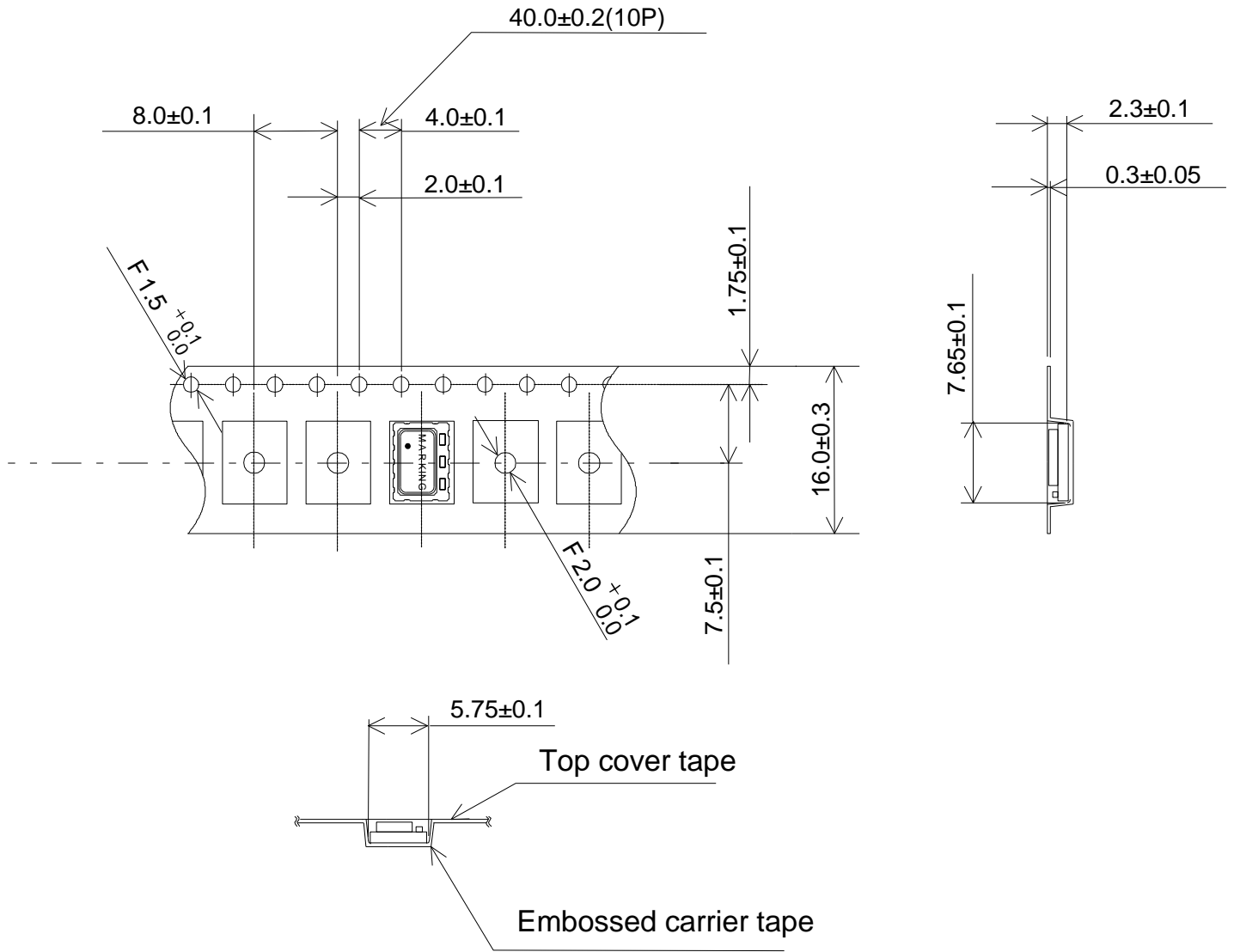
#1	NC	
#2	NC	
#3	NC	
#4	GND	
#5	OUTPUT	
#6	Do not connect	*1
#7	NC	
#8	Enable/Disable	
#9	V <sub>CC</sub>	*2
#10	V <sub>cont</sub>	

\*1 Please do not connect with terminal.

\*2 Please connect a 0.01 uF bypass capacitor near the V<sub>CC</sub> terminal.

Date of Revise		Charge	Approved	Reason	
A					
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	22.Oct.2015	N.Sekine	Dimension: mm	±0.2	10/1
Designed	22.Oct.2015	N.Sekine	Title	Drawing No.	Rev.
Checked	22.Oct.2015	A.Nakamura			
Approved	22.Oct.2015	T.Matsumoto			
			<b>External Dimension</b>	<b>ETD14B-01907</b>	

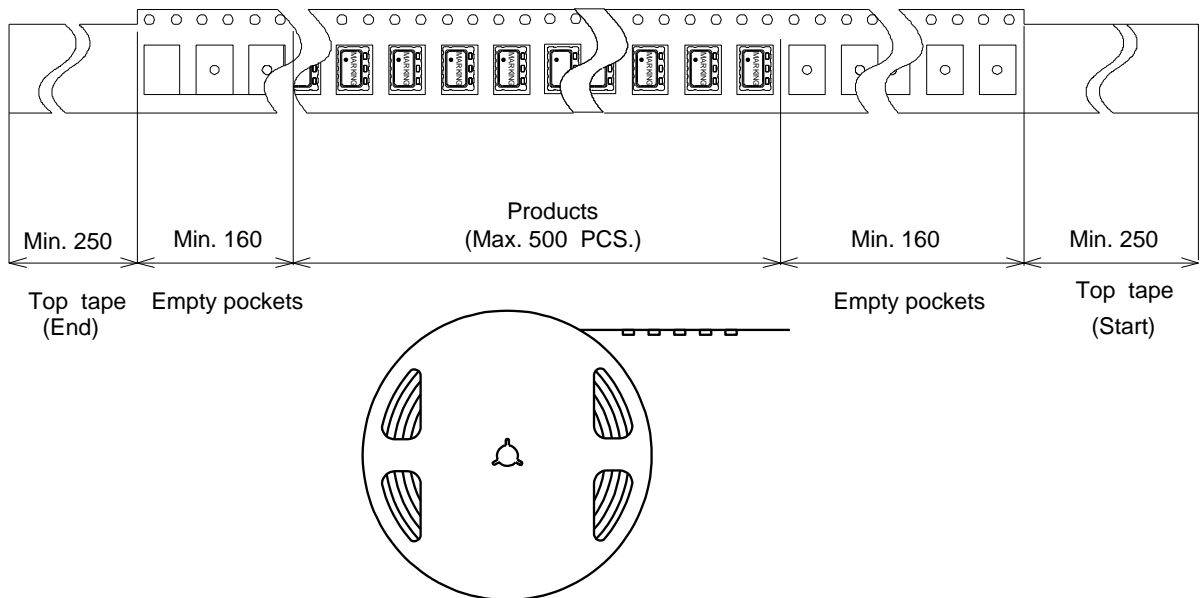
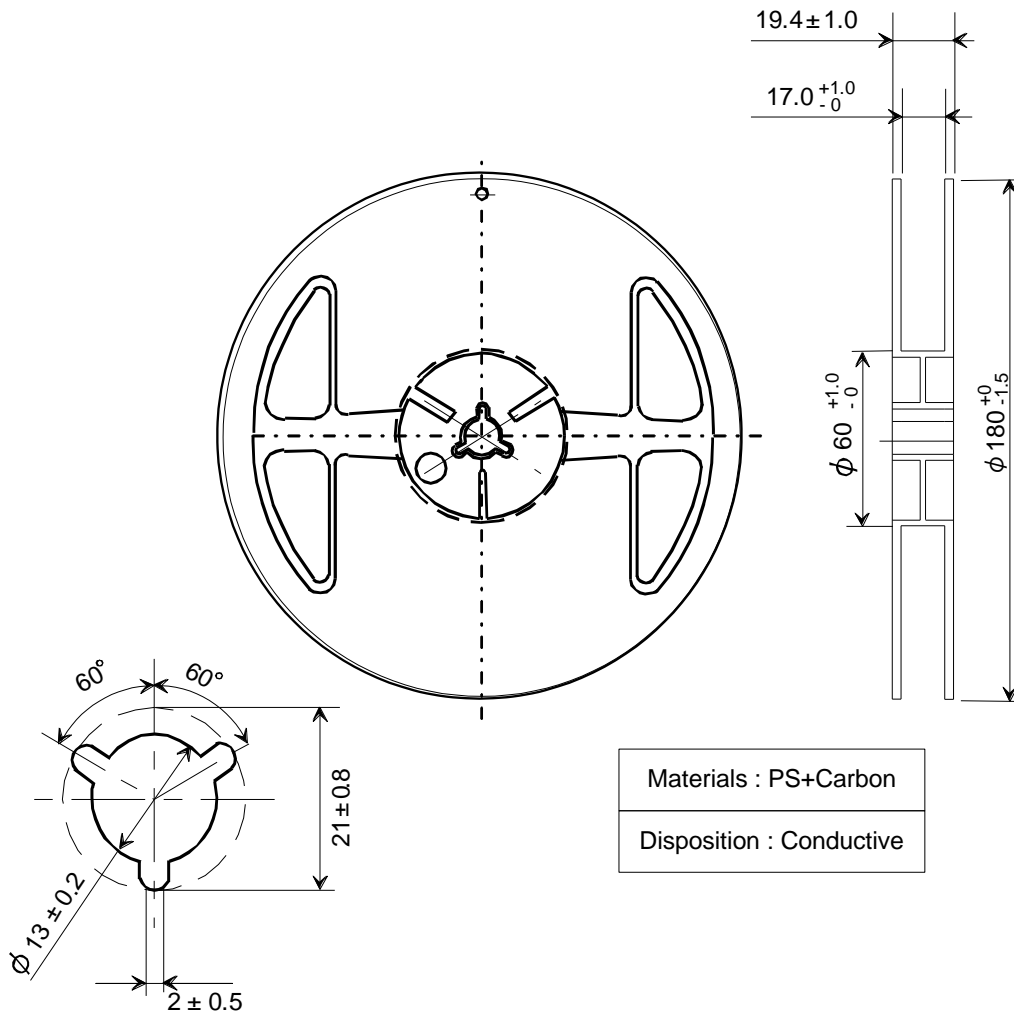
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	Embossed carrier tape	Top cover tape
Materials	PS	PET+PE+Adhesive layer
Disposition	Antistatic	Antistatic

	Date of Revise	Charge	Approved	Reason	
A					
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	11.May.2016	N.Sekine	Dimension:mm	---	---
Designed	11.May.2016	N.Sekine	Title <b>Packing</b>	Drawing No. <b>ETK17B-00436 (1/4)</b>	Rev.
Checked	11.May.2016	A.Nakamura			
Approved	11.May.2016	T.Matsumoto			

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	Date of Revise	Charge	Approved	Reason
A				
	Date	Name	Third Angle Projection	Tolerance
Drawn	11.May.2016	N.Sekine	Dimension:mm	---
Designed	11.May.2016	N.Sekine	Title	Drawing No.
Checked	11.May.2016	A.Nakamura		
Approved	11.May.2016	T.Matsumoto		
			<b>Packing</b>	<b>ETK17B-00436 (2/4)</b>
				Rev.

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## Tape break force, peel strength and angle

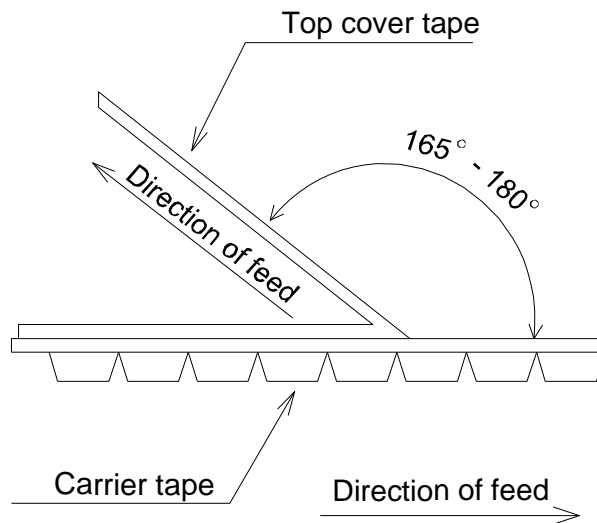
Required setting:

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.

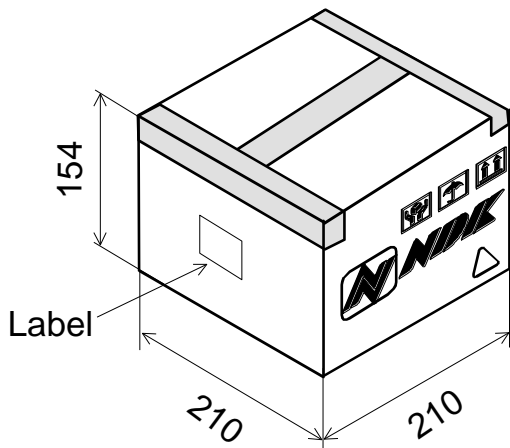
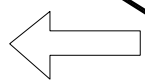
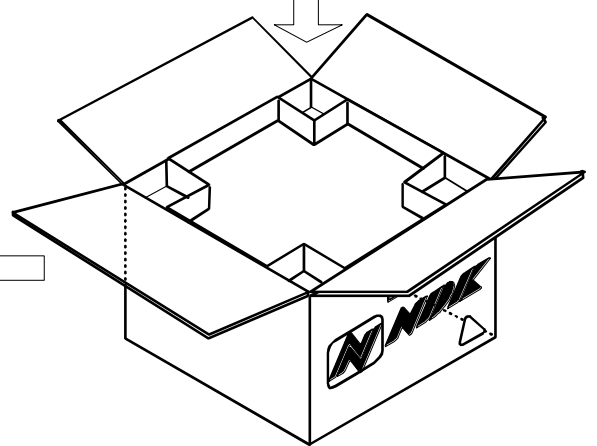
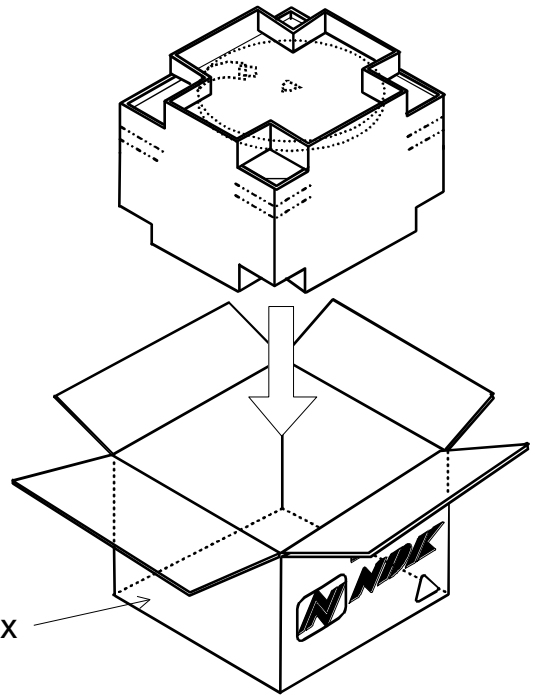
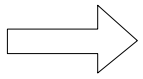
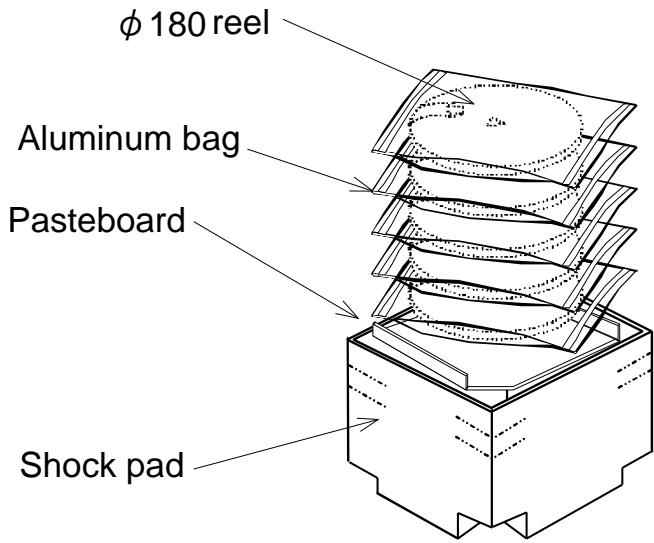
Angle between the top cover tape and the direction of feed during peel off.  
165-180°



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					
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	11.May.2016	N.Sekine	Dimension:mm	---	---
Designed	11.May.2016	N.Sekine	<b>Packing</b>	Drawing No. <b>ETK17B-00436 (3/4)</b>	Rev.
Checked	11.May.2016	A.Nakamura			
Approved	11.May.2016	T.Matsumoto			

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	Date of Revise	Charge	Approved	Reason	
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	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	11.May.2016	N.Sekine	Dimension:mm	---	---
Designed	11.May.2016	N.Sekine	Title	Drawing No.	Rev.
Checked	11.May.2016	A.Nakamura			
Approved	11.May.2016	T.Matsumoto			
			<b>Packing</b>	<b>ETK17B-00436 (4/4)</b>	

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