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DOCUMENT NO.	BQP22-L12-B02
SERIAL NO.	MC3-000083
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ACCEPTANCE

Standard Specification

PRODUCT NAME CRYSTAL CLOCK OSCILLATOR

TYPE CMX - 309FLC

FREQUENCY 1.000 ~ 30.000MHz

PARTS NO. _____

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NOTICE

- 1.If something that is ambiguously defined or undefined in this specification happened, customer and CITIZEN would discuss and take necessary steps by mutual consent.
- 2.Product test data can't be attached to this specification.
- 3.This product is not authorized for use as critical component in life support devices or systems.

1. ABSOLUTE MAXIMUM RATING

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Parameter	Conditions	CMX-309FL	Unit
Supply Voltage V_{MAX}		- 0.3 ~ + 7.0	V
Storage Temperature T_{STG}	See 8.	- 55 ~ + 125	°C
Output Current I_{OUT}		25	mA
Input Voltage V_{IN_M}		- 0.3 ~ $V_{DD} + 0.3$	V
Solder Heat Resistance Of The Outer Lead T_{SOL}		MAX.260 °C × MAX.10 seconds × 2times or MAX.230 °C × MAX.3 minutes	

2. OPERATING RANGE

Parameter	Conditions	CMX-309FL			Unit
		Min.	Typ.	Max.	
Supply Voltage V_{DD}		4.5	5.0	5.5	V
Operating Temperature T_{OPR}		- 10		+ 70	°C
Input Voltage V_{IN}		0		V_{DD}	V
Output Load C_L TTL				50 10	pF TTL

3. FREQUENCY CHARACTERISTICS

(Load \leq 50pF or 10TTL)

Parameter	Conditions	CMX-309FL	Unit
Frequency f_o	$V_{DD} = 5 \pm 0.5V$ $T_a = -10 \sim +70$ °C Load 0 ~ Max.	1.000 ~ 30.000	MHz
Frequency Stability Δf †	$V_{DD} = 5 \pm 0.5V$ $T_a = -10 \sim +70$ °C Load 0 ~ Max	± 100	ppm
Aging f_a	$V_{DD} = 5V$ $T_a = +25$ °C First year	± 5	ppm/ year

† includes initial tolerance, temperature characteristics, input voltage characteristics, load characteristics, but excludes aging.

4. ELECTRICAL CHARACTERISTICS

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(VDD = 5.0V Ta = 25 °C load=50pF or 10TTL)

Parameter	Conditions	CMX-309FL			Unit
		Min.	Typ.	Max.	
Start Up Time t_{osc}				4	m s
Power Supply Current I_{DD}	No Load			2 3	m A
Disable Current I_{INH}	OE=GND			1 2	m A
Rise Time t_r	CMOS load : 20%VDD → 80%VDD			8	n s
	TTL load : 0.4V → 2.4V			8	n s
Fall Time t_f	CMOS load : 80%VDD → 20%VDD			8	n s
	TTL load : 2.4V → 0.4V			8	n s
Duty Cycle DUTY	CMOS load : 50%VDD	4 0		6 0	%
	TTL load : 1.4V	4 5		5 5	%
Output HIGH Voltage V_{OH}	$I_{OH} = -400 \mu A$	VDD-0.4			V
Output LOW Voltage V_{OL}	$I_{OL} = 16 mA$			0.4	V
Input HIGH Voltage V_{IH}	OE	2.0			V
Input LOW Voltage V_{IL}	OE			0.8	V
Output Disable Time t_{PZX}	See 5.			100	n s
Output Enable Time t_{PZX}				100	n s

5. THREE STATE OUTPUT OPERATION

OE Input	Clock Output
HIGH or OPEN	Active : enable
LOW	High-impedance : disable

Propagation delay time between

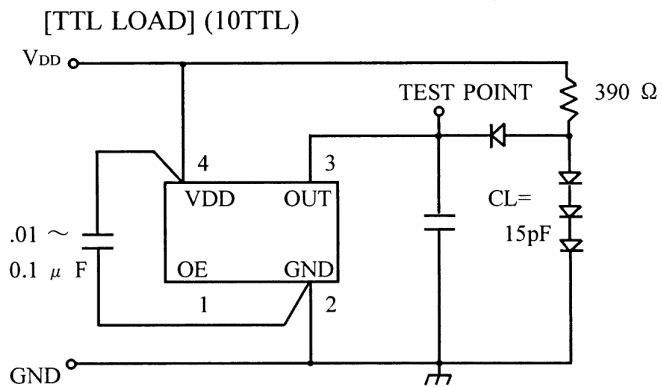
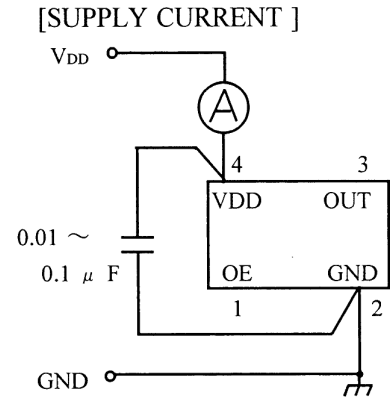
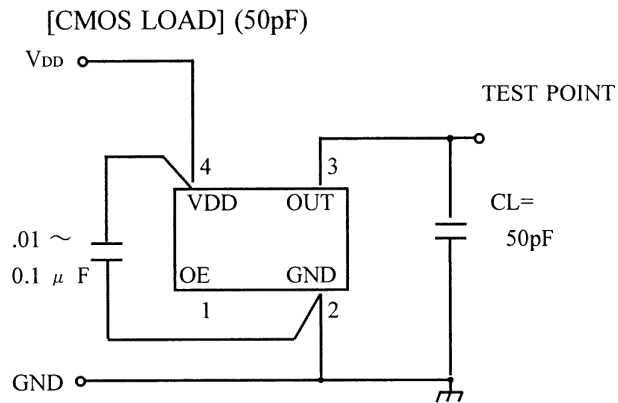
t_{PZX} : OE (HIGH → LOW) and
OUTPUT(active level
→ high-impedance)

t_{PZX} : OE (LOW → HIGH) and
OUTPUT(high-impedance
→ active level)

NOTE: A disable clock output does not synchronize with OE, because internal quartz oscillator is continuous.

6. TEST CIRCUIT

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[MEASUREMENT CONDITION]

1. Oscilloscope

Impedance: No less than 1M Ω

Capacitance: No more than 15pF

Band width: No less than 400MHz

The length of GND lead of the probe should be as short as possible.

2. The CL includes the probe capacitance.

3. Grounding should be single-point grounding.

4. Supply impedance should be as low as possible.

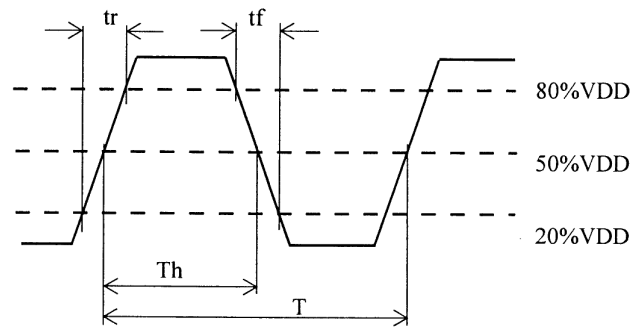
0V \rightarrow 4.5V rise time is No less than 150 μ s

5. Use the ammeter that internal impedance is small.

7. OUTPUT WAVEFORM

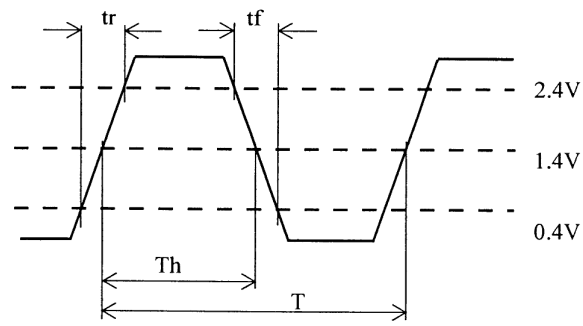
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[CMOS LOAD] (50pF)



$$\text{DUTY} = T_h / T$$

[TTL LOAD] (10TTL)



$$\text{DUTY} = T_h / T$$

8. ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS

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The following are our reliability test conditions.

Item	Test Method	CMX-309FL	
		Frequency *1 Shift after Test	Electrical
Temperature Cycle	-55 ~ 125 °C (NO BIAS) (15min. × 100cycles)	± 20 ppm	Electrical Characteristics satisfy the spec.4.
Temperature Humidity Bias	+85 °C × 85% × 3.6V × 1000hours	± 20 ppm	
High Temp. Storage	+125 °C × NO BIAS × 500hours	± 50 ppm	
Low Temp. Storage	-55 °C × NO BIAS × 1000hours	± 20 ppm	
Pressure Cooker Test	+126 °C × 85%RH × 0.203MPa × NO BIAS × 96hours	± 40 ppm	
Vibration	15Hz ~ 500Hz, 1.5mm p-p or 10G 15Hz ~ 500Hz ~ 15Hz 15min./cycle 3 direction × 2hours for each direction	± 10 ppm	
Drop	Free drop from 75cm height on a hard wooden board for 3 times	± 20 ppm	
Resistance to Soldering Heat	Into solder bath +260 °C ± 5 °C for 20 sec.	± 10 ppm	
Solderability	Dip into solder bath +230 °C for 5 sec.	90% of the dipped terminal is soldered.	
Terminal Strength	Pulling a terminal 500g weight for 10 sec.	No defect for lead	

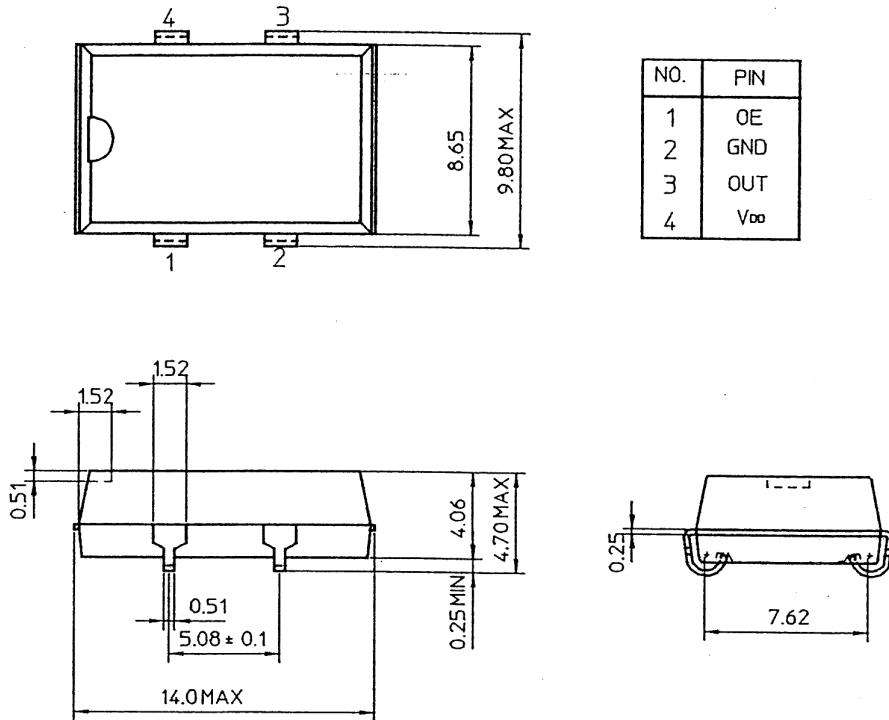
Each test is independently examined.

*1 The value of after test is measured after putting in room temperature for 2 ~ 24hours.

9. DIMENSIONS AND MARKING

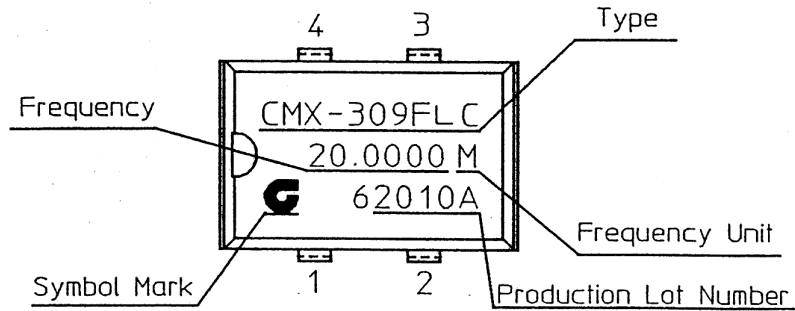
《 Dimensions 》

(UNIT mm)



NO.	PIN
1	OE
2	GND
3	OUT
4	V _{DD}

《 Marking 》



(Type)

CMX-309FL	B	B: ±50ppm(-10~+70℃)
	L	C: ±100ppm(-10~+70℃) F: ±100ppm(-40~+85℃)
	FL	FL: 5V(Fundamental) 10TTL(45-55%)/50pF
	FS	FS: 5V(Fundamental) 50pF(45-55%)
	HW	HW: 5V(Overtone) 10TTL(45-55%)/50pF
	HS	HS: 5V(Overtone) 50pF(45-55%)
	FB	FB: 3.3V(Fundamental) 30pF(40-60%)
	FA	FA: 3.3V(Fundamental) 30pF(45-55%)
	HB	HB: 3.3V(Overtone) 30pF(40-60%)
	HA	HA: 3.3V(Overtone) 30pF(45-55%)

10. TAPE AND REEL PACKAGING

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Devices under this specification are packaged on 24mm tape in shipping container in accordance with the additional document "TAPE AND REEL PACKAGING SPECIFICATION".

11. NOTES

1 . HANDLING

(ELECTROSTATIC DISCHARGES)

This device is made with CMOS circuitry. Please take precautions to prevent damage due to electrical static discharge.

(SHOCK RELIABILITY)

This device contains a quartz crystal, so please do not give too much shock or vibration. An automatic inserion is available, however, the internal quartz crystal might be damaged in case that too much shock or vibration is given by machine condition. Be sure to check your machine condition in advance.

(CLEANING)

Since, depending on the cleaning conditions, there is a possibility of damage being caused to the Crystal Osillator, do not fail to test and confirm the results beforehand, using your company's cleaning conditions.

(TEMPERATURE AND HUMIDITY)

We recomend to store and use device under normal temperature and humidity. When this device is used in high humidity applications, there is a potential problem with condensation. As with other IC's, please take precautions to prevent condensation.

2 . CIRCUIT DESIGNS

(POWER LINES)

We recomend placing a 0.01 to 0.1 μ F capacitor between V_{DD} and GND to obtain stable operation and protect against power line ripple .
 V_{DD} and GND pattern should be as wide as possible.

(OE INPUT LINE)

When OE pin is not used, please connect it to V_{DD} .

(OUTPUT LINE)

As a long output line may cause irregular output, please take care to design that output line is as short as possible, and also keep high level signal source away from this device.

TAPE AND REEL PACKAGING SPECIFICATION

I .SCOPE

This specification defines the procedure for TAPE AND REEL PACKAGING for CMX-309 Series.

II .TABLE OF CONTENTS

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{ 1 }	TAPING	A-2, A-3
{ 2 }	INNER CARTON	A-4
{ 3 }	OUTER CARTON	
{ 4 }	MARKING	A-5
{ 5 }	QUANTITY	
{ 6 }	STORAGE ENVIRONMENT	
{ 7 }	HANDLING	

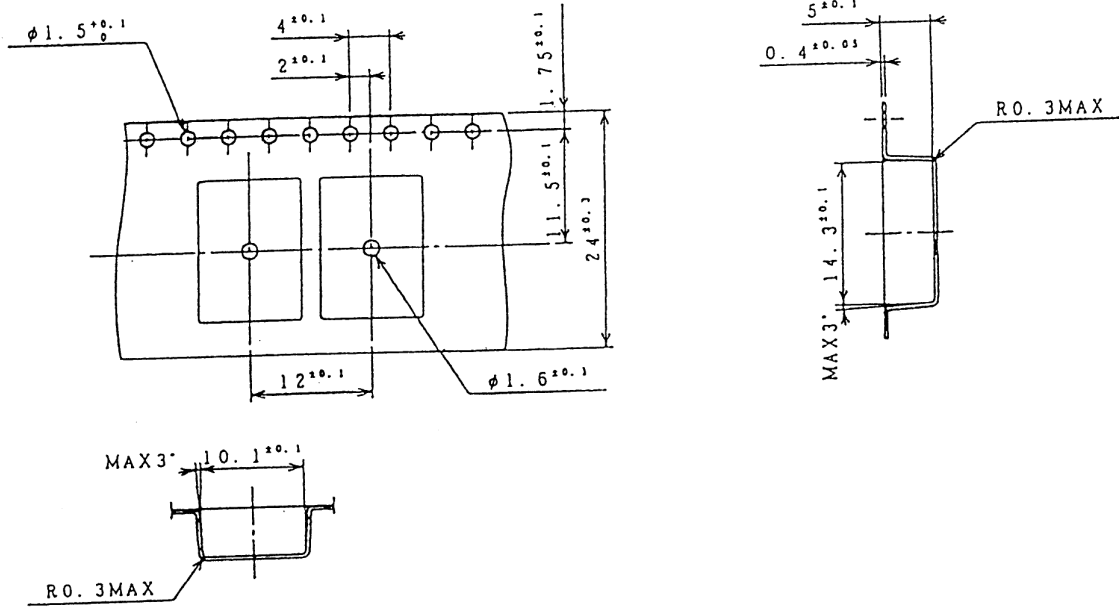
[1] TAPING SPECIFICATION

Subject to EIA-481A & JIS C-0806

(1) Tape Dimensions JIS TB-2412

Material of the Carrier Tape : PS conduct

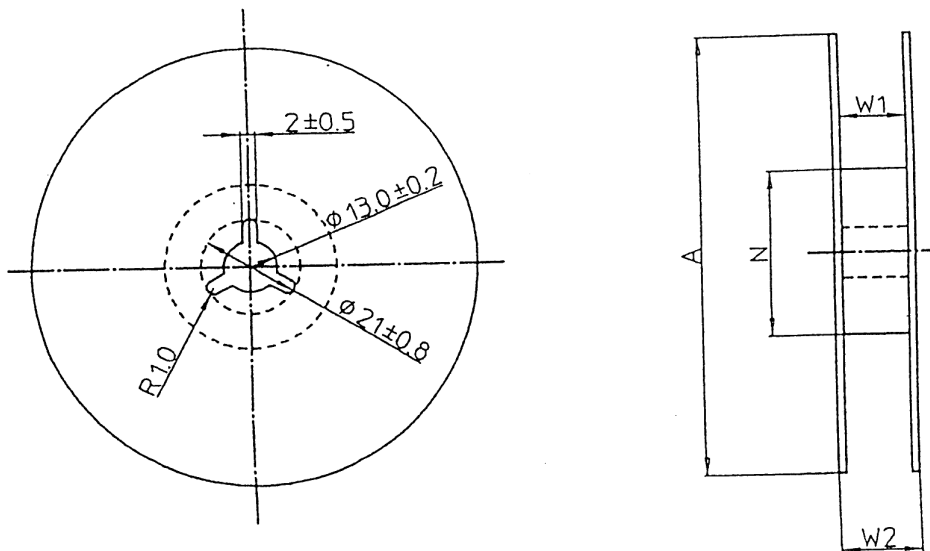
Material of the Cover Tape : PET



(2) Reel Dimensions

Center material : Corrugated Cardboard

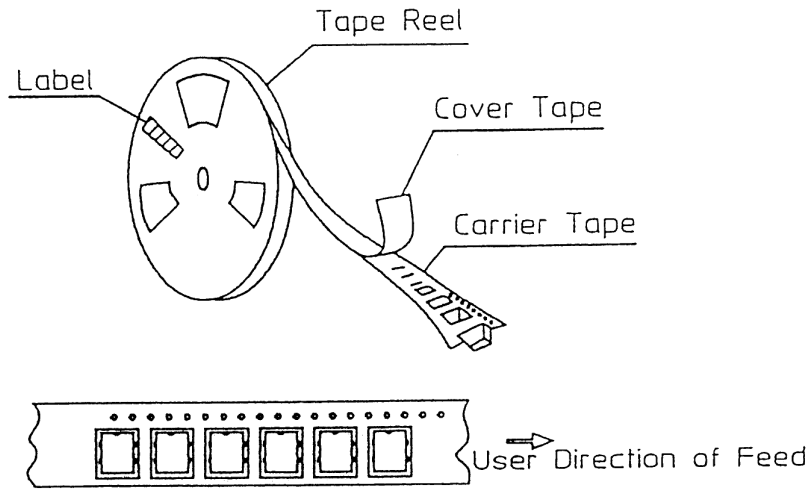
Material of the Reel : Cardboard



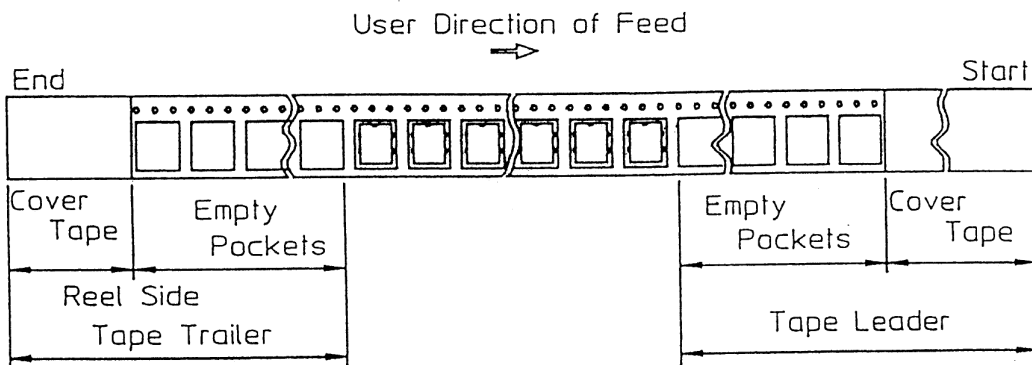
Symbol	A	N	W1	W2
Dimension(mm)	$\phi 330 \pm 2.0$	$\phi 80 \pm 1.0$	25.5 ± 1.5	29.5 ± 2.0

(3) Packing

① Tape & Reel

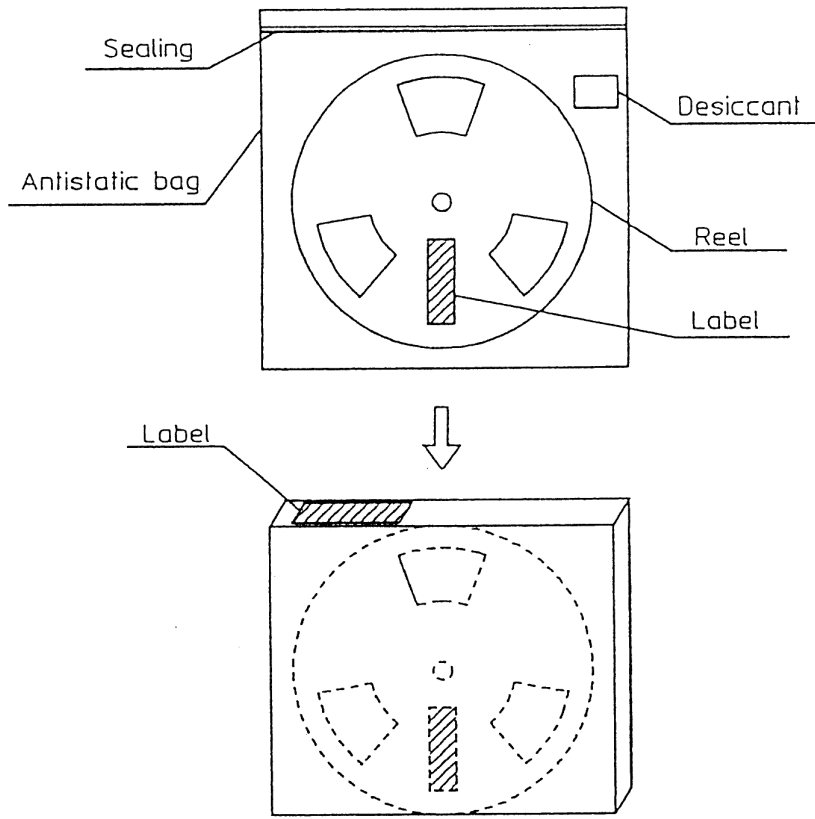


② Start & End Point

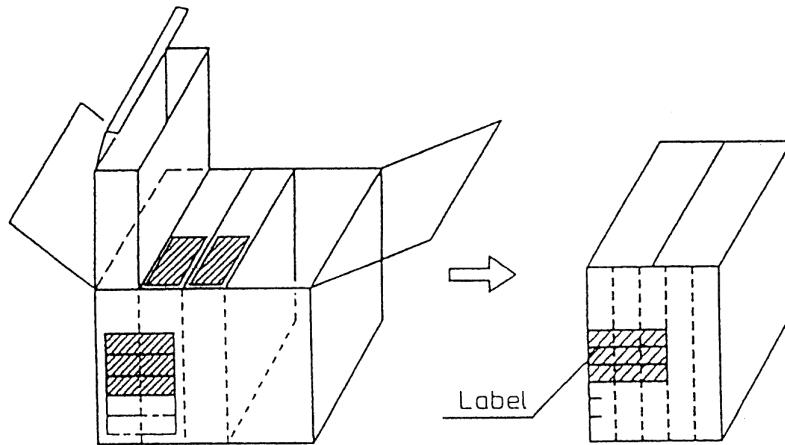


Item		Empty Space
Tape Leader	Cover Tape	Min. 1000 mm
	Carrier Tape	Min. 10 Pockets
Tape Trailer	Cover Tape	Min. 0 mm
	Carrier Tape	Min. 10 pockets

[2] INNER CARTON



[3] OUTER CARTON



[4] MARKING

(1) Reel Marking

Reel Marking is consist of:

- * Parts name or type
- * Frequency
- * Quantity
- * Manufacturing Date or symbol
- * Manufacturer's name or symbol
- * Others(if necessary)

(2) Inner Carton Marking same as Reel Marking

(3) Outer Carton Marking same as Reel Marking

[5] QUANTITY

1000 pcs/reel

[6] STORAGE ENVIRONMENT

- * Storage the reel at normal temperature and humidity
- * Open the packing just before using.
- * Do not expose the sun.
- * Do not storage with some erosive chemicals.
- * Nothing is allowed to put on the reel or carton to prevent mechanical damage.

[7] HANDLING

- * Handle with care to prevent the damage of tape, reel and products.