This document contains specifications which apply to TSX-4025 16.000MHz Crystal Unit.

1. General Specification

No.	Item	Description
1.1	EPSON TOYOCOM parts number	TN4-25888
1.2	User's name	
1.3	User's parts number	
1.4	Operating temperature range	-20°C to +75°C

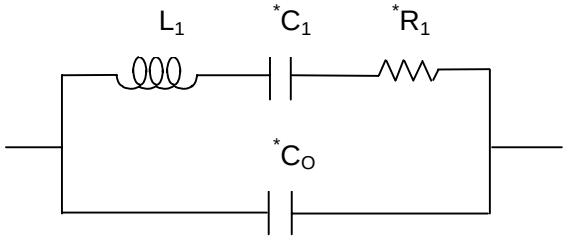
2. Mechanical Characteristics

No.	Item	Description
2.1	Package	TSX-4025(TSX-10A)
2.2	Dimensions	4.0±0.15 x 2.5±0.15 x 0.7 max. [mm]
2.3	Marking	Laser marking (1)EPSON TOYOCOM's ID / 4 digits (2)EPSON TOYOCOM Mark (3)Lot No./ 4 digits
2.4	Leak rate	1 x 10^{-9} Pa·m^3/sec.max.

3. Electrical Characteristics

No.	Item	Specifications
3.1	Nominal frequency	16.000000 MHz
3.2	Resonance mode	AT-cut / Fundamental
3.3	Operating temperature range	-20°C to +75°C
3.4	Storage temperature range	-30°C to +85°C
3.5	Frequency tolerance	±10 ppm (at +25±2°C)
3.6	Frequency stability	±9 ppm (-20 to +75°C, Ref. 25±2°C)
3.7	Equivalent series resistance(R1) *See fig.1	40 ohms max.
3.8	Operating drive level	0.1 mW max..
3.9	Load capacitance	9.0 pF
3.10	Shunt capacitance(C0) *See fig.1	1.2 pF typ
3.11	Pulling sensitivity	15 ppm/pF min.(at CL=9±1pF)
3.12	Aging	±1ppm/year(at +25±2°C)

Fig.1 Equivalent circuit



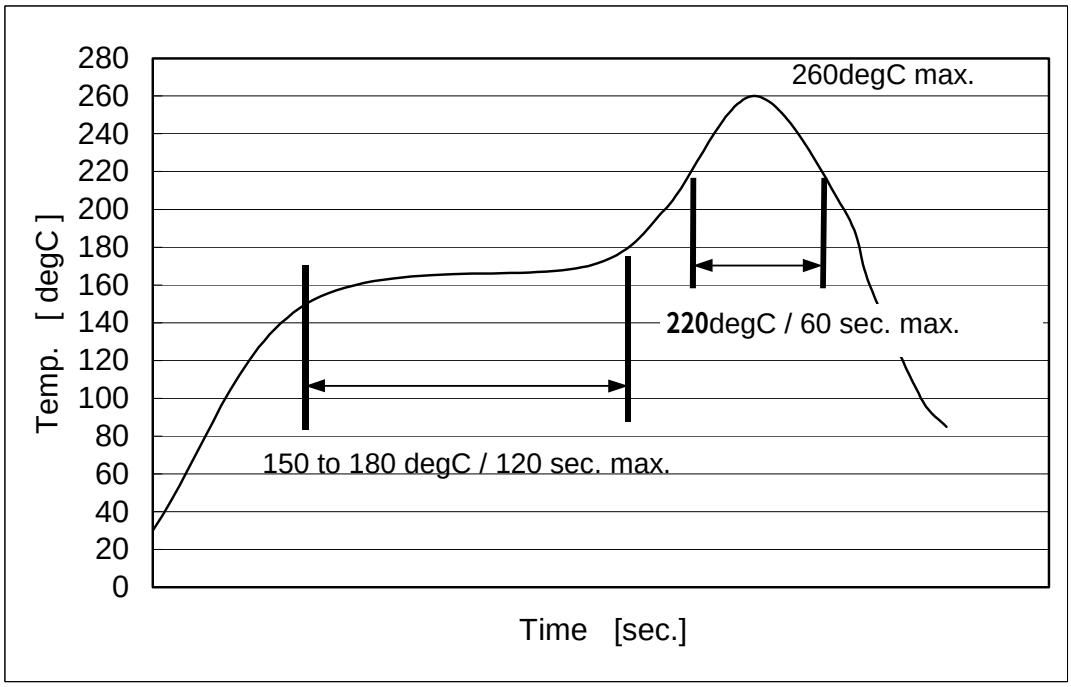
4.Reliability

No.	Item	Conditions	Contents
4.1	Drop Shock		The components shall remain within the table 1 and mechanical specifications after test.
	method	fallen on the concrete with 100g dummy. (thickness is 3cm or more)	
	height	150 cm	
	direction	each direction of 3 mutually perpendicular (x,y,z) axis.	
	number of shocks	10shocks in each direction	
4.2	Vibration		
	frequency/sweep time	10 to 55Hz/1 minute	
	amplitude/freq.	1.5 mm (p-p) / 10 to 55Hz	
	acceleration/freq.	----	
	direction	each direction of 3 mutually perpendicular axis	
	duration	2 hours in each direction	
4.3	Thermal shock	low temperature: -40°C for 0.5 h high temperature: +85°C for 0.5 h duration: 1000 cycles	
4.4	Cold	temperature: -35°C±3°C duration: 1000 hours	
4.5	Heat	temperature: +85±3°C duration: 1000 hours	
4.6	Static humidity	temperature: +40°C±3°C humidity: 90 to 95% duration: 500 hours	

No.	Item	Conditions	Contents
4.7	Resistance to solder heat (Reflow)	pre-heat: 150°C to 180°C, 120 sec. max. top-heat: 220°C, 60 sec. max. peak: 260°C max. time: 2 times *See fig.1	The components shall remain within No. 3.5 and mechanical specifications after test.
4.8	Solderbility	Immerse in soldering bath. temperature: 230°C±5°C time: 5±0.5 sec.	More than 3/4 area of the soldering pad must be covered with new solder.

	Frequency	Equivalent series resistance
table 1	±2 ppm max.	±15% max.

Fig.1 Temperature profile of reflow soldering



5. Shipment

Crystal units will be shipped in tape and reel.

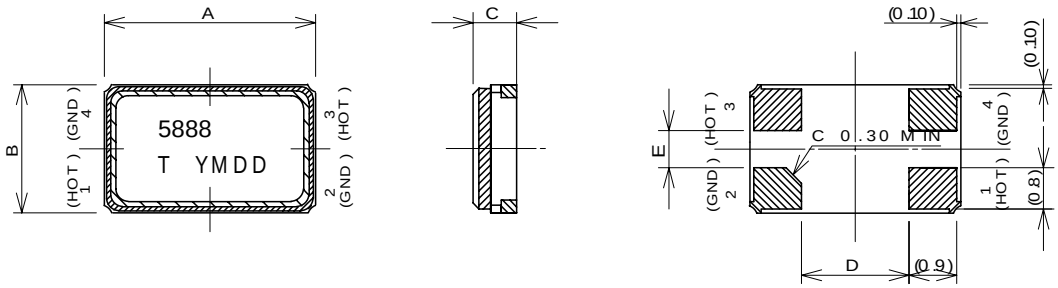
6. Remarks

6.1 Ultrasonic cleaning

Ultrasonic vibration may cause deterioration and destruction of the components.

Please avoid ultrasonic cleaning.

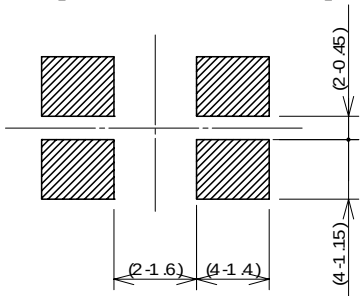
7.Package outlines and Marking(Example)



Size in mm

A	B	C	D	E
4.00 ±0.15	2.50 ±0.15	0.70 max.	2.00 ±0.20	0.70 ±0.20

[LAND PATTERN]



Marking

Laser marking

Description

EPSON TOYOCOM's ID(4 digits)

EPSON TOYOCOM Mark(T)

Lot No.(4 digits)

Y: the last 1 digit of year

M: 1 digit of month(Jan to Sept; 1 to 9, Oct;X, Nov;Y, Dec;Z)

DD: 2 digits of day

Package

Lid; KOVAR, Electrolytic Ni plating

Base; Ceramic, W+Ni+Au plated

Seal; Seam weld, N_2 gas

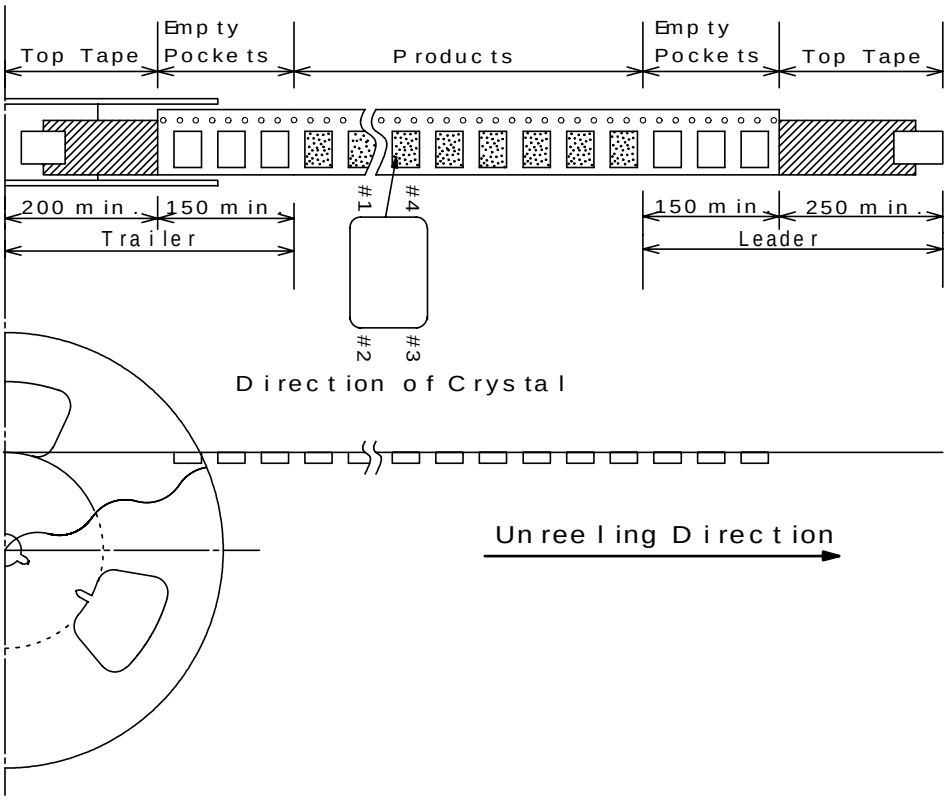
承認 APP.
照査 CHK'D
照査 CHK'D
作成 DRAW

改版記事 DESCRIPTION

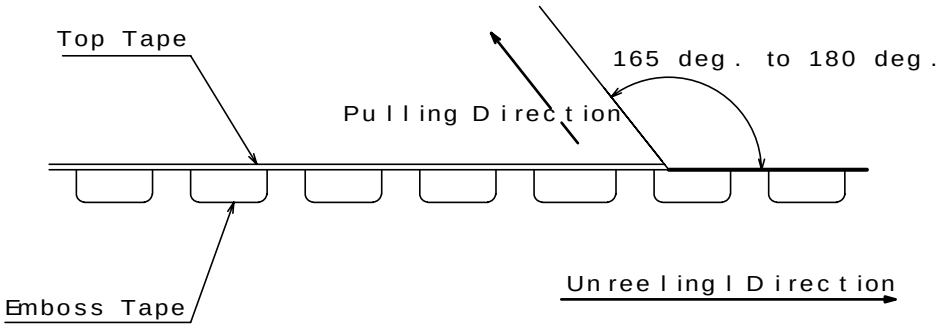
8.Tape and Reel

Page 7/11 to 9/11

Tap ing



Top Tape Pulling-off Strength



(1)Angle:165 deg. to 185 deg. from unreeling direction
(2)Speed:300 mm/min.
(3)Power:20g to 70g
(4)Others:The top tape shall not be torn while pulled off.

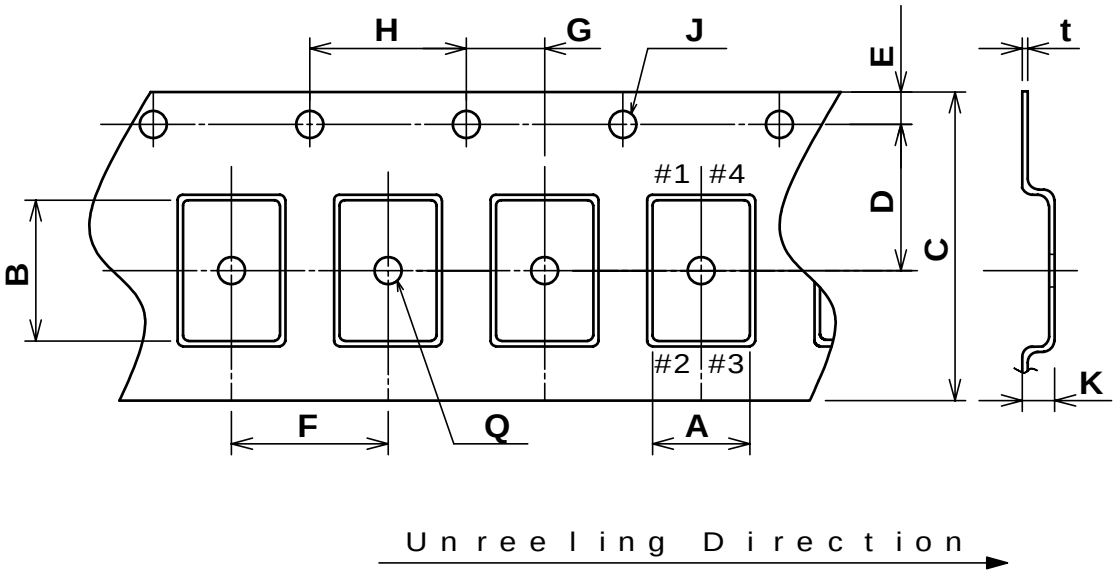
承認 APP.	照査 CHK'D	照査 CHK'D	作成 DRAW

改版記事 DESCRIPTION

REV.NO.

版	年月日 DATE
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

Emboss Tape



Unreeling Direction

A	B	C	D	E	F
2.9±0.1	4.4±0.1	12.0±0.2	5.5±0.1	1.75±0.1	4.0±0.1
G	H	J	K	Q	t
2.0±0.1	4.0±0.1	dia.1.5+0.1/0	0.9±0.1	dia.1.5+0.1/0	0.25±0.05

Size in mm

Note

1)Cumulative pitch tolerance: ±0.15mm at 10 pitches

2)Material: PS(Antistatic material)

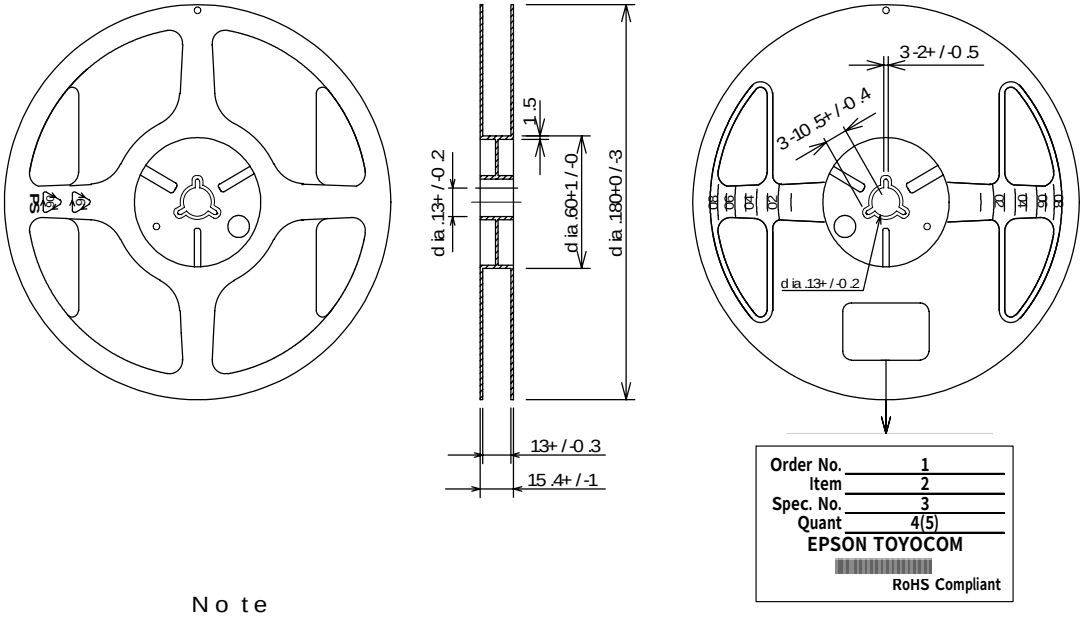
承認 APP.
照査 CHK'D
照査 CHK'D
作成 DRAW

改版記事 DESCRIPTION

版	年月日 DATE
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

REV.NO.

Reel



Note
1) Reel is recyclable
2) Material: PS(Antistatic material)
3) Label:1.Order number
:2.Nominal frequency
:3.Specification number
:4.Quantity
:5.Lot number(YMDD)
*The label should be stuck on the reel.

承認 APP.
照査 CHK'D
照査 CHK'D
作成 DRAW

改版記事 DESCRIPTION

9. Packing

Put one reel(2000pcs max.) into an anti-static bag separately, and in the case of some reels, put them into a poly bag together.

Put the following label(A) on the both bags.

(A)

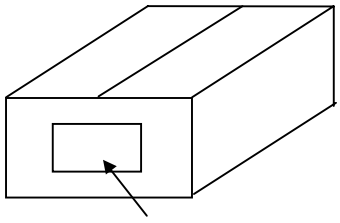
EPSON TOYOCOM	
TYPE	
FREQ	MHZ
QUANTITY	PCS
Product Lot. NO	

RoHS Compliant MADE IN JAPAN

Put the wrapped reels with cushion into outer cardboard box and seal by gum tape. Carton size varies according to the order quantity and the following are main carton styles. And Crystal Unit quantity is 80000pcs max./Carton.

Carton Style	Size (mm)	Quantity
T-2	L:294 x W:194 x H:171	1reels max.
KB	L:400 x W:300 x H:170	10reels max.
T-4W	L:400 x W:300 x H:316	30reels max.
KD	L:441 x W:339 x H:333	40reels max.

Put the following label(B) on the face of the cardboard.



(B)

(B)

EPSON TOYOCOM	
PURCHASE ORDER. NO	
PART. NO	
FREQUENCY	MHz
QUANTITY	PCS
O/C. NO	
CARTON. NO	

RoHS Compliant