Specifications

Drawing No.	USY1M-H1-16575-00 1 /10
Issued Date.	Jun,3,2016

Messrs: Digi-Key

Note: Part Number will be revised in case of specification change.

Product Type	Quartz Crystal
Series	CX2016DB
Frequency	48000kHz
Customer Part Number	-
Customer Specification Number	-
KYOCERA Part Number	CX2016DB48000E0DLFA1
Remarks Pb-Free, RoHS Compliant, MSL 1	

Customer Approval

Approval Signature	Approved Date	
	Department	
	Person in charge	

Seller
KYOCERA Crystal Device Corporation
(Sales Division)
6 Takeda Tobadono-cho, Fushimi-ku, Kyoto
612-8501 Japan
TEL. No. 075-604-3500
FAX. No. 075-604-3501

Manufacturer
KYOCERA Crystal Device Corporation
Crystal Units Division
5850, Higashine-Koh, Higashine-Shi, Yamagata
999-3701 Japan
TEL. No. 0237-43-5611
FAX. No. 0237-43-5615

Design Department	Quality Assurance	Approved by	Checked by	Issued by
KYOCERA Crystal Device Corporation Crystal Unit Design Engineering Section Crystal Units Division	S.Itoh	T.Soda	A.Muraoka	Y.Nozaki

Revision History

Rev.No.	Description of revise	Date	Approved by	Checked by	Issued by
00	First Edition	Jun,3,2016	T.Soda	A.Muraoka	Y.Nozaki

1. APPLICATION

The purpose of this document is applied to CX2016DB quartz crystal.

2. KYOCERA PART NUMBER

CX2016DB48000E0DLFA1

3. RATINGS

Items	SYMB.	Rating	Unit	Remarks
Operating Temperature range	Topr	-30~+85	deg. C	
Storage Temperature range	Tstg	-40~+85	deg. C	

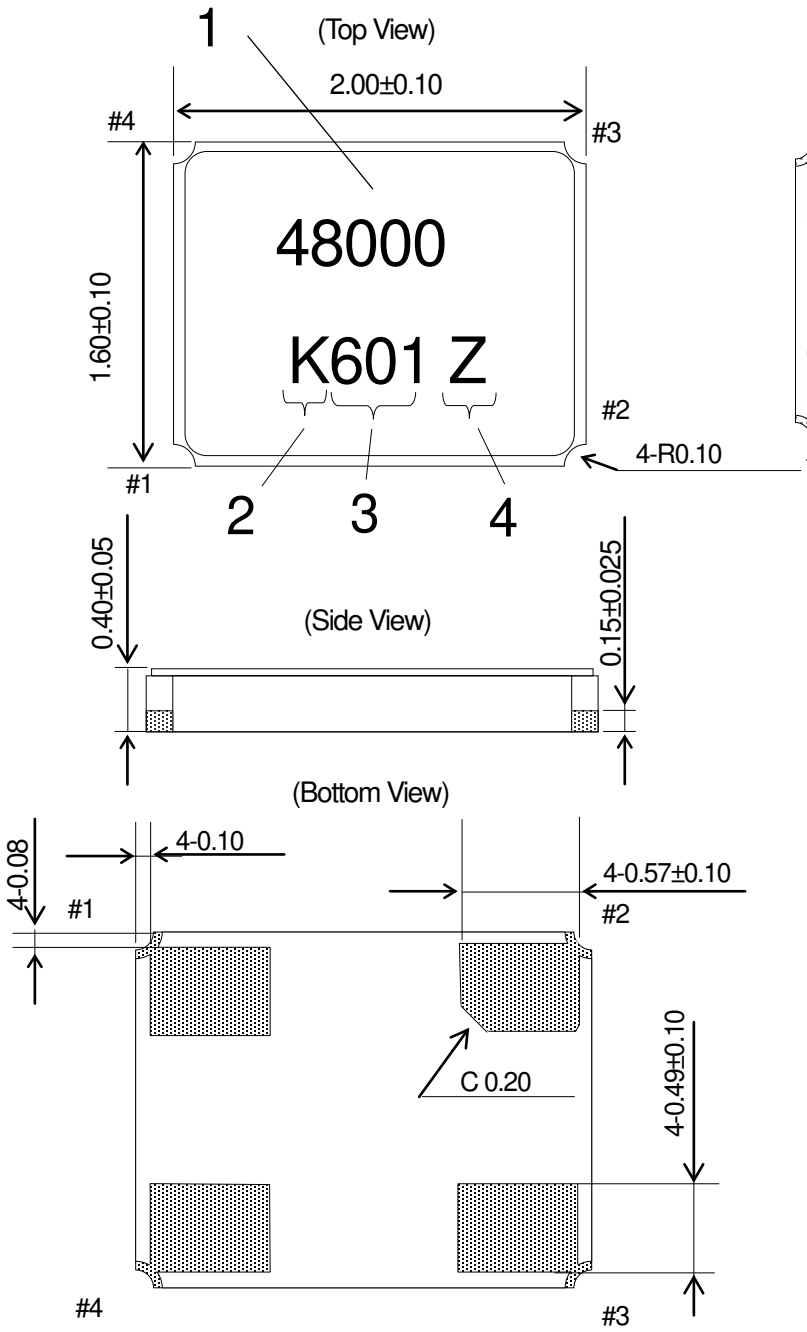
4. CHARACTERISTICS

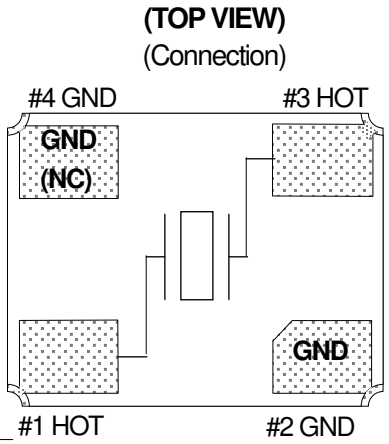
4-1 ELECTRICAL CHARACTERISTICS

Items	Electrical Specification					Test Condition	Remarks
	SYMB.	Min	Typ.	Max	Unit		
Mode of Vibration			Fundamental				
Nominal Frequency	F0		48		MHz		
Nominal Temperature	T_{NOM}		+25		℃		
Load Capacitance	CL		11.1		pF	IEC 60444-8 STD (Pi circuit 41901A)	
Frequency Tolerance	df/F	-8.0		+8.0	PPM	Network Analyzer E5100A	
Frequency Temperature characteristics	df/F	-10.0		+10.0		-30~+85℃	
Frequency Ageing Rate		-2.0		+2.0		5 years	At +25±3℃
Equivalent Series Resistance	ESR			22	Ω		
Spurious mode series resistance		1100			Ω		±700kHz
Drive Level	Pd	10		100	μW		
Insulation Resistance	IR	500			MΩ	100V(DC)	
Shunt Capacitance	C_0	0.64	0.84	1.04	pF	IEC 60444-8 STD (Pi circuit 41901A)	
Motional Capacitance	C_1	2.16	3.16	4.16	fF		
Motional Inductance	L_1	1.00	3.49	4.00	mH		

5. APPEARANCES, PHYSICAL DIMENSION

OUTLINE DIMENSION (not to scale)





PIN NO.	PIN Layout
#1	HOT
#2	GND
#3	HOT
#4	GND(NC)

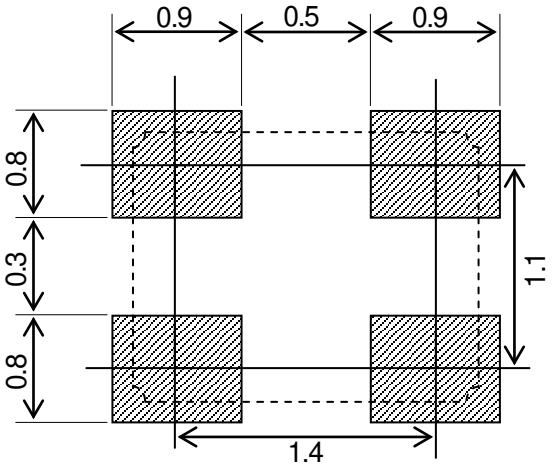
UNIT: mm

MARKING

1	Nominal Frequency	First 5digit of the frequency is indicated.
2	Identification	[K] is to indicate 1Pin direction.
3	Date Code	Last 1 Digit of YEAR and WEEK (Ex) 2016,Jan,01 → 601
4	Manufacturing Location	Y→Japan (Yamagata) Z→Japan (Shiga Yohkaichi) T→Thailand

***The font of marking is for reference only.**

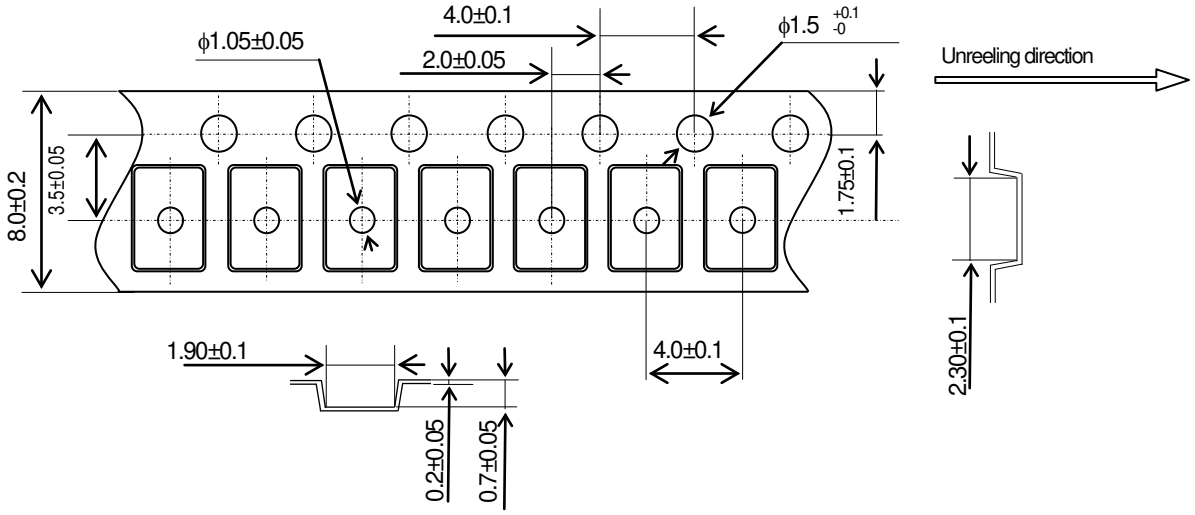
6. RECOMMENDED LAND PATTERN (not to scale)



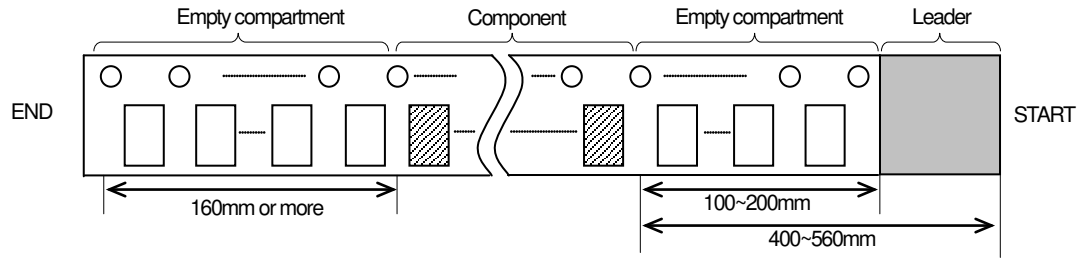
UNIT: mm

7. TAPING & REEL

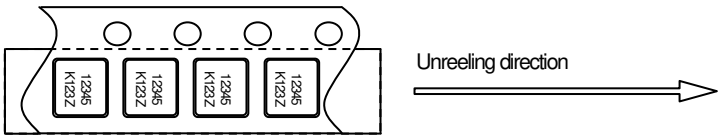
7-1.Dimensions



7-2.Leader and Carrier tape

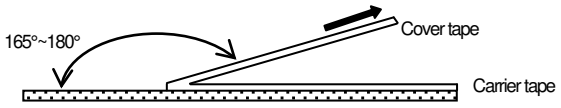


7-3.Direction (Orientation shall be checked from the top cover tape side)

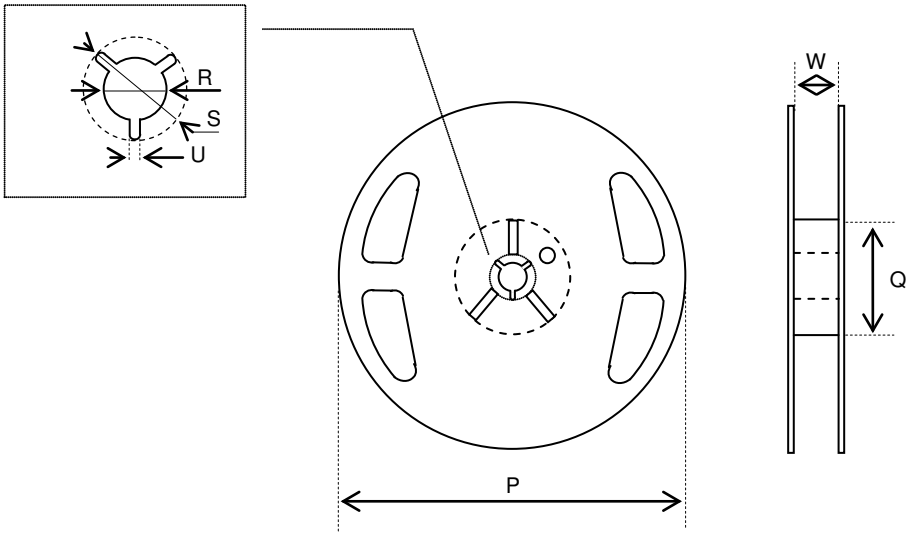


7-4.Specification

1. Material of the carrier tape is either polystyrene or A-PET (ESD).
2. Material of the cover tape is polyester (ESD).
3. The seal tape shall not cover the sprocket holes and not protrude from the carrier tape.
4. Tensile strength of carrier tape: 10N or more.
5. The R of the corner of each cavity is 0.2RMAX.
6. The alignment between centers of the cavity and sprocket hole shall be 0.05mm or less.
7. The orientation shall be checked from the top cover tape side as shown in 7-3.
8. Peeling force of cover tape: 0.1 to 1.0N.
9. The component will fall out naturally when cover tape is removed and set upside down.



7-5.Reel Specification



ϕ180 Reel (3,000 pcs Max.)

Symbol	P	Q	R
Dimension	ϕ180 +0/-3	ϕ60 +1/-0	ϕ13±0.2
Symbol	S	U	W
Dimension	ϕ21±0.8	2.0±0.5	9±1

(Unit: mm)

ϕ330 Reel (15,000 pcs Max.)

Symbol	P	Q	R
Dimension	ϕ330±2.0	ϕ100±1.0	ϕ13±0.2
Symbol	S	U	W
Dimension	ϕ21±0.8	2.0±0.5	9.4±1.0

(Unit: mm)

8. Environmental requirements

After conducting the following tests, component needs to meet below conditions.

Frequency: Fluctuation within +/-10 x 10^{-6}

CI: Fluctuation within +/-20% or 5Ω whichever is larger

8.1 Resistance to Shock — Test condition

3 times natural drop from 100cm onto hard wooden board.

8.2 Resistance to Vibration — Test condition

frequency	: 10 - 55 - 10 Hz
Amplitude	: 1.5mm
Cycle time	: 15 minutes
Direction	: X,Y,Z (3direction),2h each.

8.3 Resistance to Heat — Test condition

The quartz crystal unit shall be stored at a temperature of +85±2°C for 500h and subjected to room temperature for 1h before measurement.

8.4 Resistance to Cold — Test condition

The quartz crystal unit shall be stored at a temperature of -40±2°C for 500h and subjected to room temperature for 1h before measurement.

8.5 Thermal Shock — Test condition

The quartz crystal unit shall be subjected to 500 temperature cycles shown in table below,Then it shall be subjected to room temperature for 1h before mesurement.

Cycle :-40±2°C (30min.)→+25±2°C(5min.)
→ +85±2°C(30min.)→ +25±2°C(5min.)

8.6 Resistance to Moisture Test condition

The quartz crystal unit shall be stored at a temperature of +60±2°C with relative humidity of 90% to 95% for 240 h. Then it shall be subjected to room temperature for 1h before measurement.

8.7 Soldering condition 1.) Type of solder

Material → lead free solder paste

Melting point → +220±5°C

2.) Reflow temp.profile

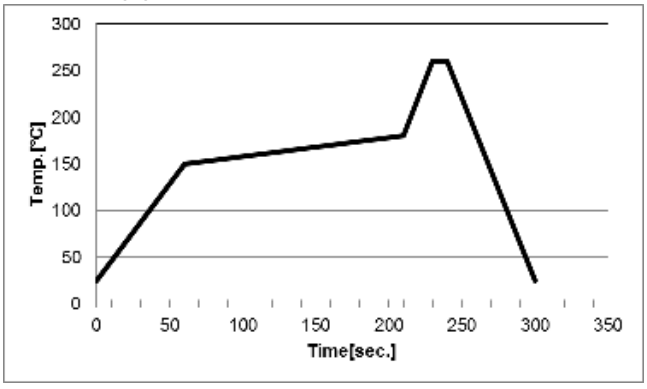
	Temp [°C]	Time[sec]
Preheating	+150 to +180	150 (typ.)
Peak	+260±5	10 (max.)
Total	-	300 (max.)

Frequency shift : ±2ppm

3.) Hand Soldering +350°C 3 sec max

4.) Reflow Times 2 times in below Reflow temp. profile

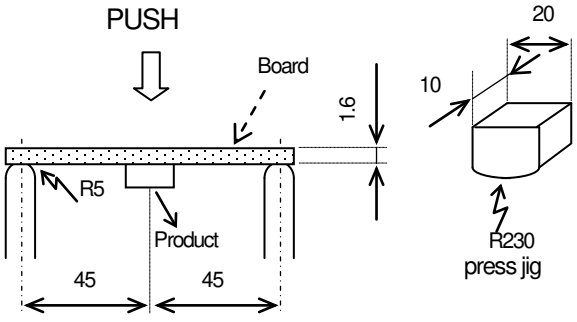
Reflow temp.profile



8.8 Bending Strength

Solder this product in center of the circuit board (40mm X 100mm), and add deflection of 3mm.

Test board : t=1.6mm



UNIT: mm

9. Cautions for use

(1) Soldering upon mounting

There is a possibility to influence product characteristics when Solder paste or conductive glue comes in contact with product lid or surface.

(2) When using mounting machine

Please minimize the shock when using mounting machine to avoid any excess stress to the product.

(3) Conformity of a circuit

We strongly recommend to make sure that Negative resistance (Gain) of IC is designed to be 3 times the ESR (Equivalent Series Resistance) of crystal unit.

10. Storage conditions

Please store product in below conditions, and use within 6 months.
Temperature +18 to +30°C, and Humidity of 20 to 70 % in the packaging condition.

11. Manufacturing location

Kyocera Crystal Device Corporation Yamagata Plant
Kyocera Crystal Device Corporation Shiga Yohkaichi Plant
Kyocera Crystal Device (Thailand) Co., Ltd

12. Quality Assurance

To be guaranteed by Kyocera Crystal Device Quality Assurance Division

13. Quality guarantee

In case when Kyocera Crystal Device Corporation rooted failure occurred within 1year after its delivery, substitute product will be arranged based on discussion. Quality guarantee of product after 1year of its delivery is waivered.

14. Others

In case of any questions or opinions regarding the Specification, please have it in written manner within 45 days after issued date.