

# Specifications

|              |                            |
|--------------|----------------------------|
| Drawing No.  | UKY1C-H1-23513-00[27] 1/10 |
| Issued Date. | May.29,2023                |

## TO: Digi-Key

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**Note:** Part numbers may be revised in the event of any specifications change.

|                               |                                |
|-------------------------------|--------------------------------|
| Product Type                  | Quartz Crystal                 |
| Series                        | CX1612DB                       |
| Frequency                     | 40000kHz                       |
| Customer Part Number          | -                              |
| Customer Specification Number | -                              |
| KYOCERA Part Number           | CX1612DB40000D0WLLCC           |
| Remarks                       | Pb-Free, RoHS Compliant, MSL 1 |

### Customer Approval

|                    |                  |  |
|--------------------|------------------|--|
| Approval Signature | Approved Date    |  |
|                    | Department       |  |
|                    | Person in charge |  |


### Seller

#### KYOCERA Corporation

Corporate Electronic Components Group  
Electronic Components Sales Division  
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612-8501 Japan  
TEL. No. 075-604-3500  
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### Manufacturer

Corporate Electronic Components Group  
Electronic Devices Division

|  |                   |             |            |            |   |
|--|-------------------|-------------|------------|------------|---|
| Design Department  | Quality Assurance | Approved by | Checked by | Checked by | Issued by   |
| KYOCERA Corporation<br>Crystal Components Application Engineering Section1<br>Electronic Devices Division<br>Corporate Electronic Components Group | A. Ito            | W. Muraoka  | F. Horie   | T. Saito   | Y. Kikuchi<br> |

**KYOCERA Corporation**

## Revision History

| Rev.No. | Description of revision | Date        | Approved by | Checked by | Issued by  |
|---------|-------------------------|-------------|-------------|------------|------------|
| 00      | First Edition           | May.29,2023 | W. Muraoka  | F. Horie   | Y. Kikuchi |
|         |                         |             |             |            |            |

## 1. APPLICATION

This specification sheet is applied to quartz crystal "CX1612DB40000D0WLLCC"

## 2. KYOCERA PART NUMBER

CX1612DB40000D0WLLCC

## 3. RATINGS

| Items                       | SYMB. | Rating     | Unit | Remarks |
|-----------------------------|-------|------------|------|---------|
| Operating Temperature Range | Topr  | -30 to +85 | °C   |         |
| Storage Temperature Range   | Tstg  | -40 to +85 | °C   |         |

## 4. CHARACTERISTICS

### ELECTRICAL CHARACTERISTICS

| Items                                 | Electrical Specification |             |      |       |      | Test Condition       | Remarks                                     |
|---------------------------------------|--------------------------|-------------|------|-------|------|----------------------|---|
|                                       | SYMB.                    | Min         | Typ. | Max   | Unit |                      |   |
| Mode of Vibration                     |                          | Fundamental |      |       |      |                      |   |
| Nominal Frequency                     | F0                       |             | 40   |       | MHz  |                      |   |
| Nominal Temperature                   | T <sub>NOM</sub>         |             | +25  |       | °C   |                      |   |
| Load Capacitance                      | CL                       | 8.0         |      |       | pF   |                      |   |
| Frequency Tolerance                   | df/F                     | -20.0       |      | +20.0 | PPM  | +25±3°C              | by Measurement Conditions                   |
| Frequency Temperature Characteristics | df/F                     |             |      |       |      | -30 to +85°C         | Based on an oscillation frequency at +25 °C |
| Frequency Aging Rate                  |                          |             |      |       |      | 1 <sup>st</sup> year | +25±3°C                                     |
| Equivalent Series Resistance          | ESR                      |             |      | 80    | Ω    |                      | by Measurement Conditions                   |
| Drive Level                           | Pd                       | 0.01        |      | 100   | μW   |                      |   |
| Insulation Resistance                 | IR                       | 500         |      |       | MΩ   | 100V(DC)             |   |

## 5. Measurement Condition

### 5.1 Frequency measurement

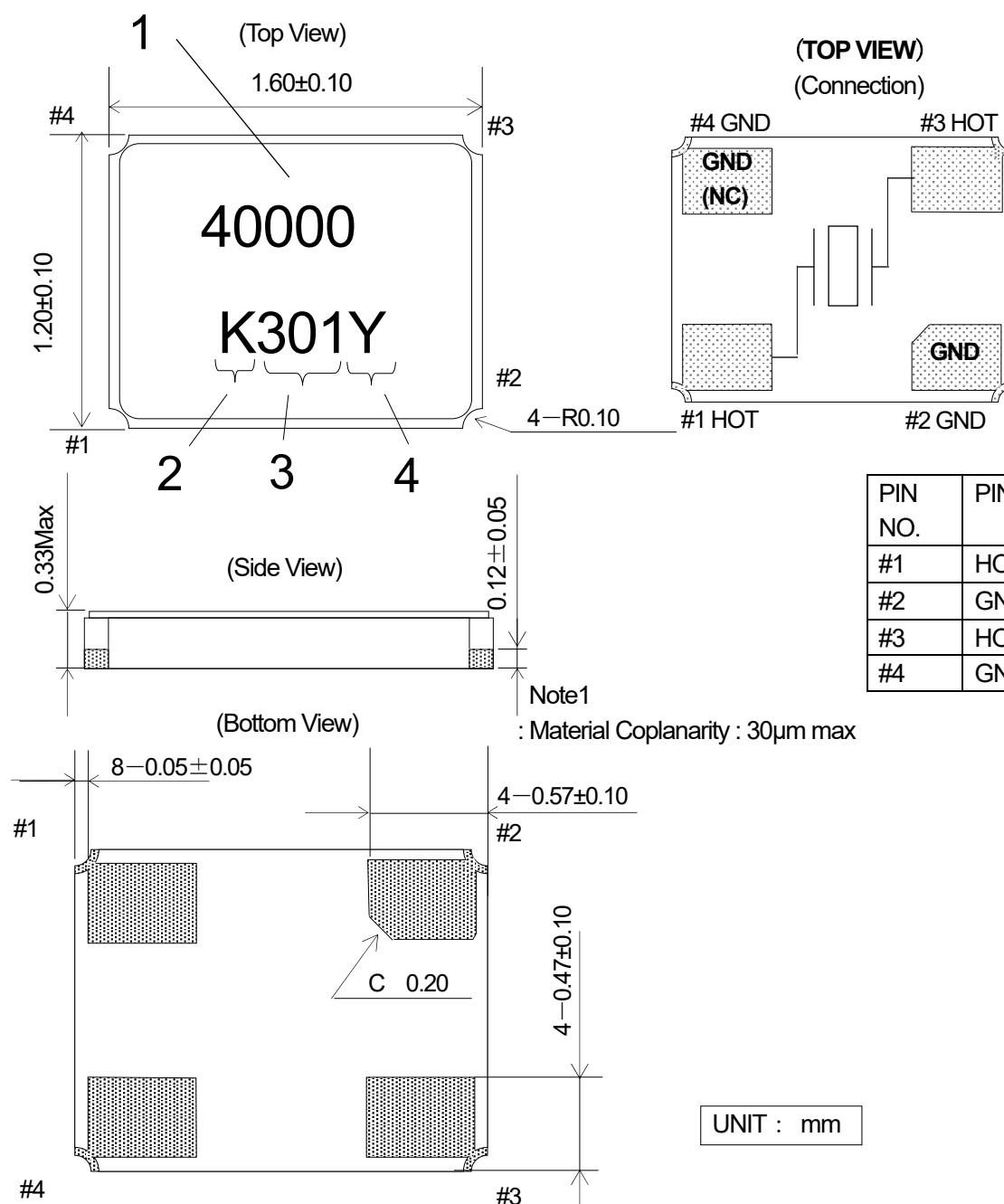
Measuring instrument : IEC PI-Network Test Fixture  
 Load Capacitance : 8.0pF  
 Drive Level : 10μW

### 5.2 Equivalent series resistance (ESR) measurement

Measuring instrument : IEC PI-Network Test Fixture  
 Load Capacitance : Series  
 Drive Level : 10μW

## 6. APPEARANCES, DIMENSIONS

### OUTLINE DIMENSION (not to scale)

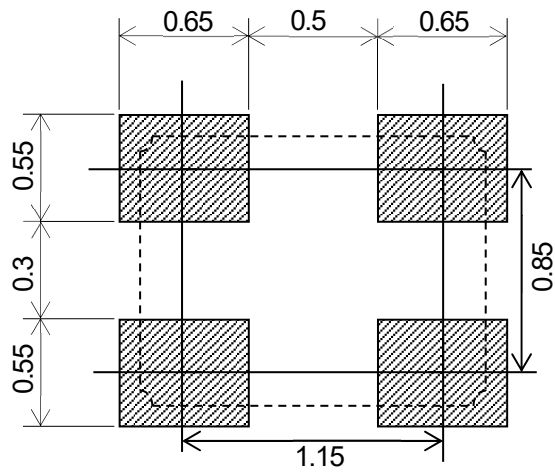


### MARKING

- Nominal Frequency First 5digit of the frequency is indicated.
- Identification [K] is to indicate 1Pin direction.
- Date Code Last 1 Digit of YEAR and WEEK  
(Ex) Jan,01,2023 → 301
- Manufacturing Location  
 Y...Japan (Yamagata )  
 Z...Japan (Shiga Yohkaichi )

※The font of marking is for reference only.

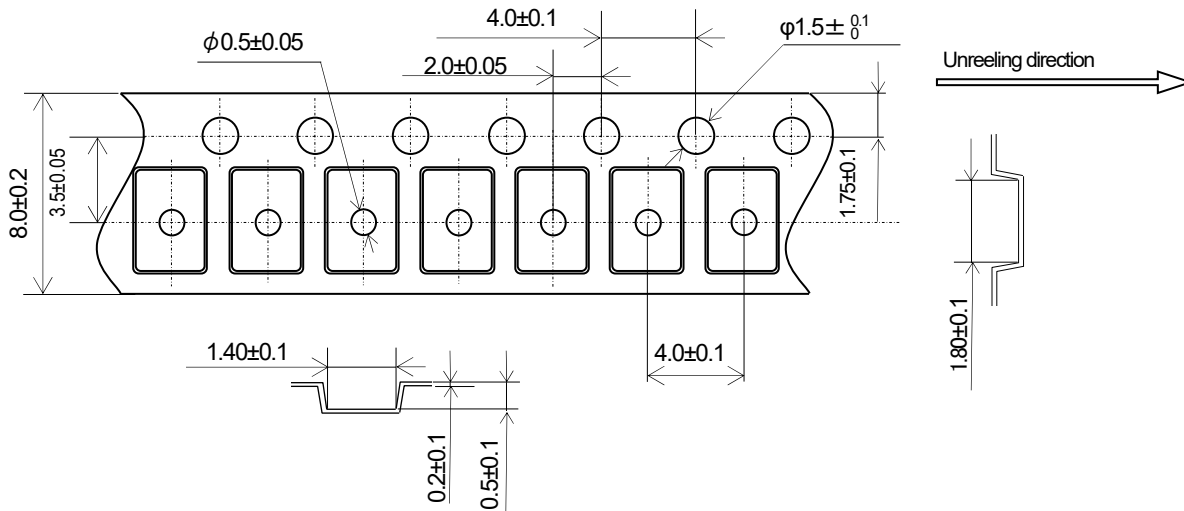
KYOCERA Corporation

**7. RECOMMENDED LAND PATTERN (not to scale)**

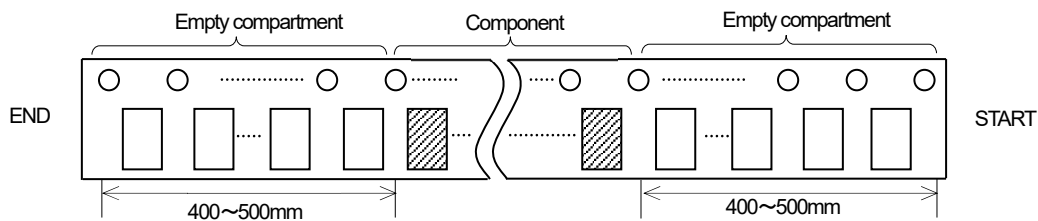
UNIT : mm

## 8. TAPING&REEL

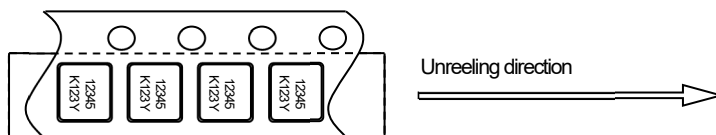
### 8-1.Dimensions



### 8-2.Leader and Carrier tape

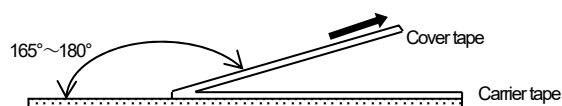


### 8-3.Direction (Orientation shall be checked from the top cover tape side)

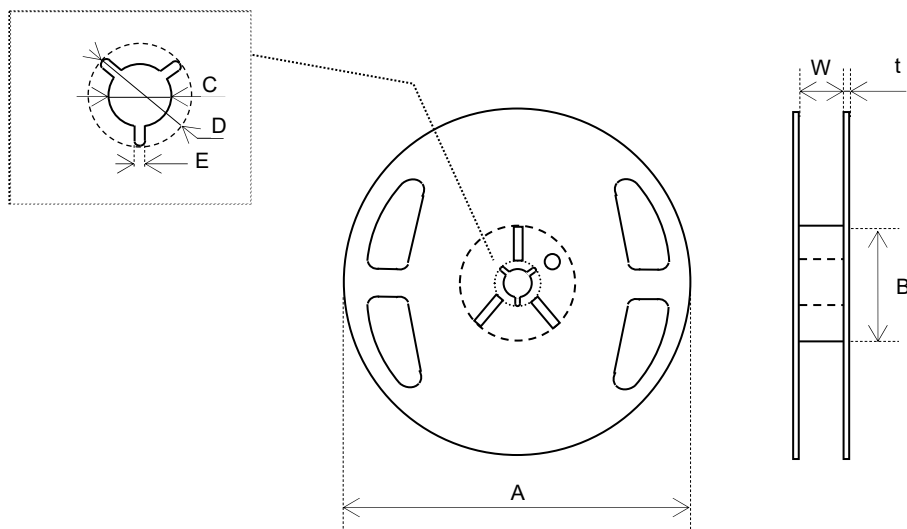


### 8-4.Specification

1. Material of the carrier tape is either polystyrene or A—PET (ESD).
2. Material of the cover tape is PET/PE (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  $0.2R_{MAX}$ .
6. The alignment between centers of the cavity and sprocket hole shall be  $0.05 \text{ mm}$  or less.
7. The orientation shall be checked from the top cover tape side as shown in 8-3.
8. Peeling force of cover tape:  $0.1$  to  $1.0 \text{ N}$ .
9. The component will fall out naturally when cover tape is removed and set upside down.



## 8-5.Reel Specification



φ180 Reel (3,000 pcs Max. )

| Symbol    | A          | B         | C       | D       |
|-----------|------------|-----------|---------|---------|
| Dimension | φ180 +0/-3 | φ60 +1/-0 | φ13±0.2 | φ21±0.8 |
| Symbol    | E          | W         | t       |         |
| Dimension | 2.0±0.5    | 9±1       | 2.0±0.5 |         |

(Unit : mm)

φ330 Reel (20,000 pcs Max.)

| Symbol    | A        | B        | C       | D       |
|-----------|----------|----------|---------|---------|
| Dimension | φ330±2.0 | φ100±1.0 | φ13±0.2 | φ21±0.8 |
| Symbol    | E        | W        | t       |         |
| Dimension | 2.0±0.5  | 9.5±0.5  | 2.2±0.1 |         |

(Unit : mm)

## 9. Enviromental requirements

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

Frequency: Fluctuation within  $\pm 10 \times 10^{-6}$

CI: Fluctuation within  $\pm 20\%$  or  $5\Omega$  whichever is larger

- |            |                                |  |           |                   |           |         |            |              |           |                                |
|------------|--------------------------------|--|-----------|-------------------|-----------|---------|------------|--------------|-----------|--------------------------------|
| 9.1        | Resistance to Shock            | <p>Test condition</p> <p>3 times natural drop from 100cm onto hard wooden board.</p>   |           |                   |           |         |            |              |           |                                |
| 9.2        | Resistance to Vibration        | <p>Test condition</p> <table border="0"> <tr> <td>frequency</td> <td>: 10 - 55 - 10 Hz</td> </tr> <tr> <td>Amplitude</td> <td>: 1.5mm</td> </tr> <tr> <td>Cycle time</td> <td>: 15 minutes</td> </tr> <tr> <td>Direction</td> <td>: X,Y,Z (3direction), 2h each.</td> </tr> </table>   | frequency | : 10 - 55 - 10 Hz | Amplitude | : 1.5mm | Cycle time | : 15 minutes | Direction | : X,Y,Z (3direction), 2h each. |
| frequency  | : 10 - 55 - 10 Hz              |  |           |                   |           |         |            |              |           |                                |
| Amplitude  | : 1.5mm                        |  |           |                   |           |         |            |              |           |                                |
| Cycle time | : 15 minutes                   |  |           |                   |           |         |            |              |           |                                |
| Direction  | : X,Y,Z (3direction), 2h each. |  |           |                   |           |         |            |              |           |                                |
| 9.3        | Resistance to Heat             | <p>Test condition</p> <p>The quartz crystal unit shall be stored at a temperature of <math>+85 \pm 2^\circ\text{C}</math> for 500h and subjected to room temperature for 1h before measurement.</p>  |           |                   |           |         |            |              |           |                                |
| 9.4        | Resistance to Cold             | <p>Test condition</p> <p>The quartz crystal unit shall be stored at a temperature of <math>-40 \pm 2^\circ\text{C}</math> for 500h and subjected to room temperature for 1h before measurement.</p>  |           |                   |           |         |            |              |           |                                |
| 9.5        | Thermal Shock                  | <p>Test condition</p> <p>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 measurement.</p> <p>Cycle : <math>-40 \pm 2^\circ\text{C}</math> (30min.) <math>\rightarrow</math> <math>+25 \pm 2^\circ\text{C}</math> (5min.)<br/> <math>\rightarrow</math> <math>+85 \pm 2^\circ\text{C}</math> (30min.) <math>\rightarrow</math> <math>+25 \pm 2^\circ\text{C}</math> (5min.)</p> |           |                   |           |         |            |              |           |                                |



## 9.6 Resistance to Moisture

## Test condition

The quartz crystal unit shall be stored at a temperature of  $+60 \pm 2^\circ\text{C}$  with relative humidity of 90% to 95% for 240 h. Then it shall be subjected to room temperature for 1h before measurement.

## 9.7 Soldering condition

## 1.) Type of solder

Material ... lead free solder paste

Melting point ...  $+220 \pm 5^\circ\text{C}$

## 2.) Reflow temp.profile

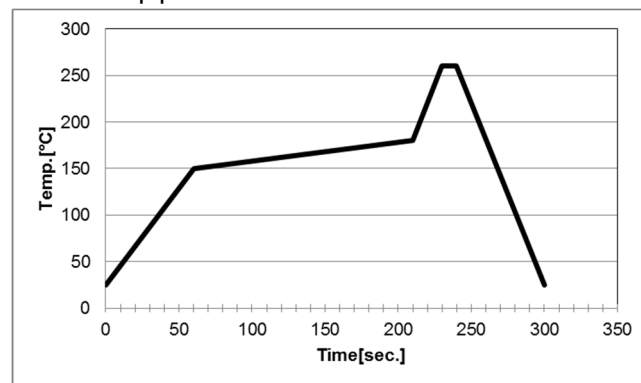
|            | Temp [ $^\circ\text{C}$ ] | Time[sec]  |
|------------|---------------------------|------------|
| Preheating | +150 to +180              | 150 (typ.) |
| Peak       | $+260 \pm 5$              | 10 (max.)  |
| Total      | —                         | 300 (max.) |

Frequency shift :  $\pm 2\text{ppm}$

3.) Hand Soldering  $+350^\circ\text{C}$  3 sec max

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

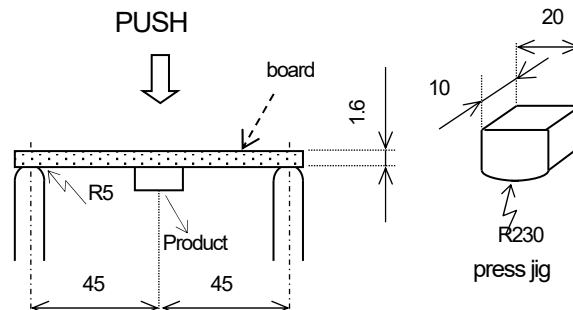
Reflow temp.profile



## 9.8 Bending Strength

Solder this product in center of the circuit board ( $40\text{mm} \times 100\text{mm}$ ), and add deflection of 3mm.

Test board :  $t = 1.6\text{mm}$



UNIT : mm

## 10. 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 5 times the ESR (Equivalent Series Resistance) of crystal unit.

## 11. 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.

## 12. Manufacturing location

Kyocera Corporation Yamagata Higashine Plant / Japan(Yamagata)

Kyocera Corporation Shiga Yohkaichi Plant / Japan(Shiga)

## 13. Quality Assurance

To be guaranteed by Kyocera Corporation Yamagata Higashine Plant Quality Assurance Division

## 14. Quality guarantee

In case when Kyocera 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 waived.

## 15. Others

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