

# Specification

|             |                             |
|-------------|-----------------------------|
| Drawing No. | <b>EQM08-5OC-00AG170-00</b> |
| Issued Date | <b>Nov-05-2012</b>          |

## To Mouser

Note: In case of specification change, KYOCERA Part Number also will be changed.

|                                                                                                     |                             |
|-----------------------------------------------------------------------------------------------------|-----------------------------|
| Customer Part Number                                                                                |                             |
| KYOCERA Part Number                                                                                 | <b>KC5032Axx.xxxxCM0E00</b> |
| Remarks:<br>This product is Pb-Free and RoHS compliant.<br>Moisture Sensitivity Level (MSL): Level1 |                             |

## Customer Acceptance

Please sign here and send one copy back to us.

|                |
|----------------|
| Signature:     |
| Accepted Date: |

### Seller

**KYOCERA Corporation**

6 Takeda Tobadono-cho, Fushimi-ku, Kyoto,  
Japan 612-8501  
TEL: +81-75-604-3500  
FAX: +81-75-604-3501

### Manufacturer

**KYOCERA Crystal Device Corporation**

1-8-1 Izumihon-cho, Komae, Tokyo,  
Japan 201-8648  
TEL: +81-3-5497-3110  
FAX: +81-3-5497-3208

| <b>Design Department</b>                                                                                                                                   | <b>Quality Assurance</b> | <b>Approved by</b> | <b>Checked by</b> | <b>Issued by</b>  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|-------------------|-------------------|
| KYOCERA Crystal Device Corporation<br>Nagano Okaya Plant<br>Oscillator Division Engineering Department<br>Clock Oscillator Application Engineering Section | <i>M. Morimoto</i>       | <i>T. Koyanagi</i> | <i>Y. Saito</i>   | <i>T. Asakura</i> |

## Revision History

[illegible]

**1. Scope**

This specification shall be defined of the Clock Oscillator for the integrated circuits (ICs).

**2. Customer Part Number****3. KYOCERA Part Number**

**KC5032Axx.xxxxCM0E00**

**4. Electrical Characteristics****4-1. Absolute Maximum Rating**

| Item                      | Symbol    | Rated Value            | Units |
|---------------------------|-----------|------------------------|-------|
| Power Supply Voltage      | $V_{CC}$  | -0.5 to +7.0           | V     |
| Input Voltage             | $V_{IN}$  | -0.5 to $V_{CC} + 0.5$ | V     |
| Storage Temperature Range | $T_{STG}$ | -55 to +125            | °C    |

Note:

If the part is used beyond absolute maximum ratings, it may cause internal destruction. The part should be used under the recommended operating conditions the reliability of this part may be damaged if those conditions are exceeded.

**4-2. Recommended Operating Conditions**

| Item                        | Symbol    | Min | Typ | Max      | Units | Remarks |
|-----------------------------|-----------|-----|-----|----------|-------|---------|
| Power Supply Voltage        | $V_{CC}$  | 1.6 | 3.3 | 5.5      | V     |         |
| Input Voltage               | $V_{IN}$  | 0   | --- | $V_{CC}$ | V     |         |
| Operating Temperature Range | $T_{OPR}$ | -10 | 25  | +70      | °C    |         |

**4-3. Electrical Characteristics**

| Item                                                          | Symbol      | Min          | Typ | Max          | Units | Remarks                                                                                                                                          |
|---------------------------------------------------------------|-------------|--------------|-----|--------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Range                                               | $F_O$       | 1.789        | --- | 50           | MHz   |                                                                                                                                                  |
| Frequency Tolerance                                           | $F_{tol}$   | -50          | --- | +50          | ppm   | Include initial tolerance, operating temperature range, rated power supply voltage change, load change, aging (1year @25°C), shock and vibration |
| Current Consumption<br>(Loaded/ $1.6 \leq V_{CC} \leq 2.0V$ ) | $I_{CC}$    | ---          | --- | 3.5          | mA    | $1.8 \leq f_0 \leq 20MHz$                                                                                                                        |
|                                                               |             | ---          | --- | 4.5          |       | $20 < f_0 \leq 40MHz$                                                                                                                            |
|                                                               |             | ---          | --- | 5.0          |       | $40 < f_0 \leq 50MHz$                                                                                                                            |
| Current Consumption<br>(Loaded/ $2.0 < V_{CC} \leq 2.8V$ )    |             | ---          | --- | 4.0          |       | $1.8 \leq f_0 \leq 20MHz$                                                                                                                        |
|                                                               |             | ---          | --- | 5.0          |       | $20 < f_0 \leq 40MHz$                                                                                                                            |
|                                                               |             | ---          | --- | 6.0          |       | $40 < f_0 \leq 50MHz$                                                                                                                            |
| Current Consumption<br>(Loaded/ $2.8 < V_{CC} \leq 3.63V$ )   |             | ---          | --- | 5.0          |       | $1.8 \leq f_0 \leq 20MHz$                                                                                                                        |
|                                                               |             | ---          | --- | 6.0          |       | $20 < f_0 \leq 40MHz$                                                                                                                            |
|                                                               |             | ---          | --- | 7.0          |       | $40 < f_0 \leq 50MHz$                                                                                                                            |
| Current Consumption<br>(Loaded/ $4.5 < V_{CC} \leq 5.5V$ )    |             | ---          | --- | 7.0          |       | $1.8 \leq f_0 \leq 20MHz$                                                                                                                        |
|                                                               |             | ---          | --- | 8.0          |       | $20 < f_0 \leq 40MHz$                                                                                                                            |
|                                                               |             | ---          | --- | 9.5          |       | $40 < f_0 \leq 50MHz$                                                                                                                            |
| Standby Current                                               | $I_{std}$   | ---          | --- | 10           | μA    |                                                                                                                                                  |
| Symmetry(Duty Ratio)                                          | SYM         | 45           | 50  | 55           | %     | @ 50% $V_{CC}$                                                                                                                                   |
| Rise Time/ Fall Time<br>(10% $V_{CC}$ to 90% $V_{CC}$ )       | $T_r / T_f$ | ---          | --- | 8.0          | ns    | $1.6 \leq V_{CC} \leq 2.0V$                                                                                                                      |
|                                                               |             | ---          | --- | 7.0          |       | $2.0 < V_{CC} \leq 2.8V$                                                                                                                         |
|                                                               |             | ---          | --- | 6.0          |       | $2.8 < V_{CC} \leq 3.63V$                                                                                                                        |
|                                                               |             | ---          | --- | 5.0          |       | $4.5 < V_{CC} \leq 5.5V$                                                                                                                         |
| Output Voltage-"L"                                            | $V_{OL}$    | ---          | --- | 10% $V_{CC}$ | V     | $I_{OL} = 4mA$                                                                                                                                   |
| Output Voltage-"H"                                            | $V_{OH}$    | 90% $V_{CC}$ | --- | ---          |       | $I_{OH} = -4mA$                                                                                                                                  |
| Output Load                                                   | CL          | ---          | --- | 15           | pF    | CMOS                                                                                                                                             |
| Input Voltage-"L"                                             | $V_{IL}$    | ---          | --- | 30% $V_{CC}$ | V     |                                                                                                                                                  |
| Input Voltage-"H"                                             | $V_{IH}$    | 70% $V_{CC}$ | --- | ---          |       |                                                                                                                                                  |
| Output Disable Time                                           | $t_{dis}$   | ---          | --- | 150          | ns    |                                                                                                                                                  |
| Output Enable Time                                            | $t_{ena}$   | ---          | --- | 5            | ms    |                                                                                                                                                  |
| Start-up Time                                                 | $t_{sta}$   | ---          | --- | 10           | ms    | @Minimum operating voltage to be 0sec                                                                                                            |
| 1 Sigma Jitter*                                               | $J_{Sigma}$ | ---          | --- | 8            | ps    | $1.8 \leq f_0 \leq 40MHz$                                                                                                                        |
|                                                               |             | ---          | --- | 5            |       | $40 < f_0 \leq 50MHz$                                                                                                                            |
| Peak to Peak Jitter*                                          | $J_{PK-PK}$ | ---          | --- | 80           |       | $1.8 \leq f_0 \leq 40MHz$                                                                                                                        |
|                                                               |             | ---          | --- | 50           |       | $40 < f_0 \leq 50MHz$                                                                                                                            |

Note: All electrical characteristics have defined on the maximum loaded and recommended operating conditions.

\* Based on Time Interval Analyzer "Wavecrest DTS-2079" with VSI 6.3.1.

**Table 1**



#### 4-4. Measurement Condition

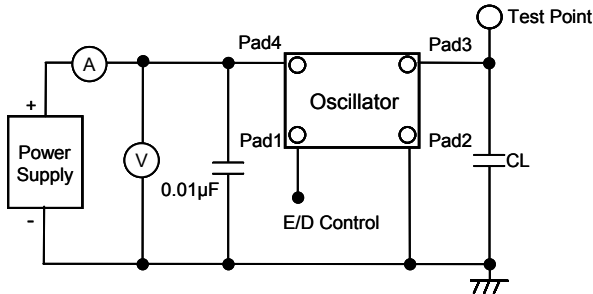
The reference temperature shall be  $25 \pm 2^\circ\text{C}$ . The measurement shall be performed at the temperature range of  $5^\circ\text{C}$  to  $35^\circ\text{C}$  unless otherwise the result is doubtful.

#### 4-5. Measurement Circuit

The electrical characteristics shall be measured by test circuit "Fig. 1". Also jitter shall be measured by test circuit "Fig. 3".

#### 4-6. Clock Timing Chart

The clock timing chart is "Fig. 2".



Note: CL includes probe and test fixture capacitance

Fig.1 Test Circuit

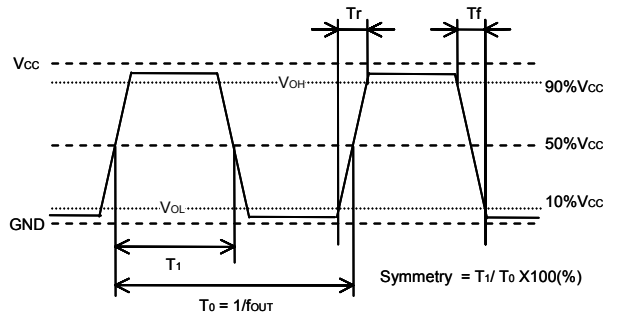


Fig.2 Clock Timing Chart (C-MOS Output)

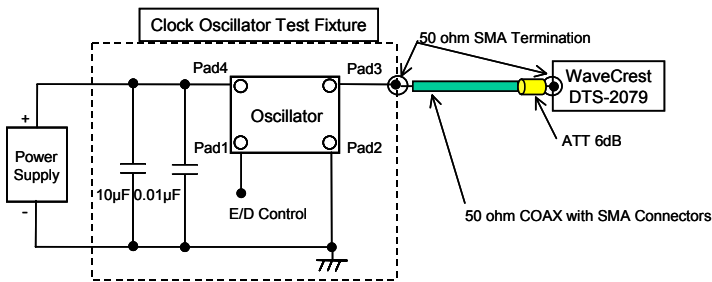
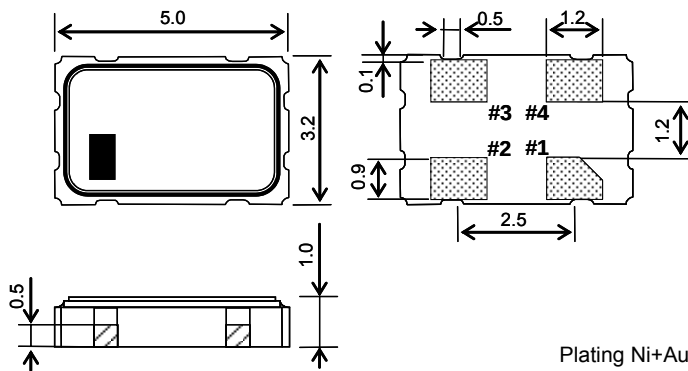


Fig.3 Jitter Test Circuit

#### <Measurement Conditions>

- Time Interval Analyzer
  - WaveCrest DTS-2079
- Jitter analysis software
  - VISI 6.3.1
- DTS timer calibration
  - Over 30minites warm-up
  - Extend 30minites calibration
- Jitter histogram conditions (Tail-fit)
  - More than 50,000cyc Hits
  - Bit Error Ratio (BER) -12 (14sigma)

## 5. Dimensions and Marking



Plating Ni+Au  
Tolerance:  $\pm 0.1$   
Unit: (mm)

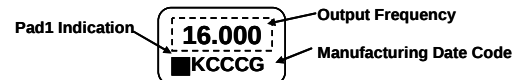
| Pad arrangement |                 |
|-----------------|-----------------|
| 1               | Enable/Disable  |
| 2               | Case GND        |
| 3               | Output          |
| 4               | V <sub>CC</sub> |

| Enable/Disable Function |                         |
|-------------------------|-------------------------|
| Pad1                    | Pad3 (Output)           |
| OPEN                    | Active                  |
| "H" Level               | Active                  |
| "L" Level               | High Z (No-Oscillation) |

#### In case of made in Philippines



#### In case of made in Japan



(e.g. Frequency: 16MHz)

#### Output Frequency

The output frequency is six-digit including a decimal point. The frequency greater than the number of digits have rounded down. (E.g. 14.31818MHz → "14.318")

#### Manufacturing Date Code

| Year                                      | Code | Year | Code | Month | Code | Day | Code | Day | Code | Day | Code |
|-------------------------------------------|------|------|------|-------|------|-----|------|-----|------|-----|------|
| 2001                                      | A    | 2011 | L    | 1     | 1    | 1   | 1    | 11  | B    | 21  | M    |
| 2002                                      | B    | 2012 | M    | 2     | 2    | 2   | 2    | 12  | C    | 22  | N    |
| 2003                                      | C    | 2013 | N    | 3     | 3    | 3   | 3    | 13  | D    | 23  | P    |
| 2004                                      | D    | 2014 | P    | 4     | 4    | 4   | 4    | 14  | E    | 24  | Q    |
| 2005                                      | E    | 2015 | Q    | 5     | 5    | 5   | 5    | 15  | F    | 25  | R    |
| 2006                                      | F    | 2016 | R    | 6     | 6    | 6   | 6    | 16  | G    | 26  | S    |
| 2007                                      | G    | 2017 | S    | 7     | 7    | 7   | 7    | 17  | H    | 27  | T    |
| 2008                                      | H    | 2018 | T    | 8     | 8    | 8   | 8    | 18  | J    | 28  | V    |
| 2009                                      | J    | 2019 | V    | 9     | 9    | 9   | 9    | 19  | K    | 29  | W    |
| 2010                                      | K    | 2020 | W    | 10    | A    | 10  | A    | 20  | L    | 30  | X    |
| It repeats from A in 2021 and afterwards. |      |      |      | 11    | B    |     |      |     |      | 31  | Y    |
|                                           |      |      |      | 12    | C    |     |      |     |      |     |      |

e.g. : "C46" means "Apr-6-2003"

Table 2



**6. Parts Numbering Guide**

**KC5032A 25.0000 C M 0 E 00**  
**A B C D E F G**

- A. Series (SMD Oscillator)  
 B. Output Frequency (E.g. 25.0000MHz)  
 C. Output  
   C: C-MOS  
 D. Supply Voltage  
   M: 1.8V/ 2.5V/ 3.3V/ 5.0V Compatible  
 E. Frequency Tolerance\*  
   0:  $\pm 50$ ppm

- F. Symmetry (Duty Ratio) and Enable/Disable Function  
   E: Symmetry: 45% to 55% with Stand-by Function  
 G. Suffix for Individual Requirements  
   (STD Specification is "00")

Packing (Tape & Reel 1,000pcs/Reel)

\*Over All Conditions:

Include initial tolerance, operating temperature range,  
 rated power supply voltage change, load change,  
 aging (1year @25°C), shock and vibration

**7. Environmental Characteristics**

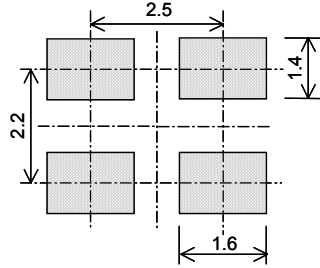
| Items                           | Conditions                                                                                                                                                  | Criteria of Acceptance                        |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 7-1. Solderability              | Soaking:<br>245 $\pm$ 5°C, 5.0 $\pm$ 0.5sec                                                                                                                 | Dipped portion:<br>Minimum 95% coverage       |
| 7-2. Soldering Heat Resistance  | Reflow soldering:<br>Peak 260°C max, 10sec, Twice max<br>Soldering iron:<br>380 $\pm$ 5°C, 3+1/-0sec,<br>Twice as one time for four pads                    | Without looseness or crack etc.               |
| 7-3. Temperature Cycle          | 10cycles:<br>-55°C to +125°C (30minuts each/ cycle)                                                                                                         | Clause 7-10 shall be satisfied.               |
| 7-4. Mechanical Shock (Pulse)   | 5 times<br>14,750m/sec <sup>2</sup> (1,500G), Duration of pulse 0.5msec<br>(MIL-STD-883D-2002.3 Condition B)                                                |                                               |
| 7-5. Vibration                  | 4 times each axis X, Y, Z:<br>20 to 2,000Hz and 2,000Hz to 20Hz/cycle<br>Peak acceleration 196m/sec <sup>2</sup> (20G)<br>(MIL-STD-883D-2007.2 Condition A) |                                               |
| 7-6. High Temperature           | 1000 hours:<br>Temperature: 85+5/-3°C                                                                                                                       |                                               |
| 7-7. Low Temperature            | 1000 hours:<br>Temperature: -40+5/-3°C                                                                                                                      |                                               |
| 7-8. Humidity Cycle             | 10 cycles:<br>Based on 1004 specifications<br>(MIL-STD-883D-1004.7)                                                                                         | Clause 7-1 shall be satisfied.                |
| 7-9. Hermeticity 1 (Gross leak) | Soaking:<br>125°C, 5minutes                                                                                                                                 | No bubbles appeared                           |
| 7-10. Hermeticity 2 (Fine leak) | Measured by Helium Detector Equipment<br>(MIL-STD-883D-1014.10 Condition A1)                                                                                | 5x10 <sup>-9</sup> Pa m <sup>3</sup> /sec max |

After each testing, the parts shall be subjected to standard atmospheric conditions more than 2 hours. After that, the electrical characteristics shall be measured. The result of the test shall be satisfied **Table 1**.

**Table 3**



## 8. Recommended Land pattern and Soldering Guide

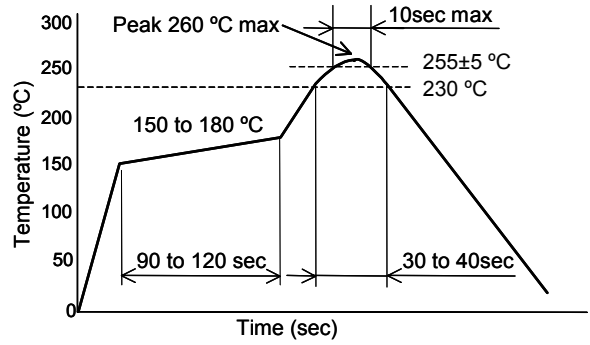


Unit: (mm)

Note:

Since the part doesn't have Bypass Capacitor between  $V_{cc}$  and GND, Please mount high frequency type capacitor  $0.01\mu F$  to the nearest position of oscillator.

**Fig.4 Land pattern**

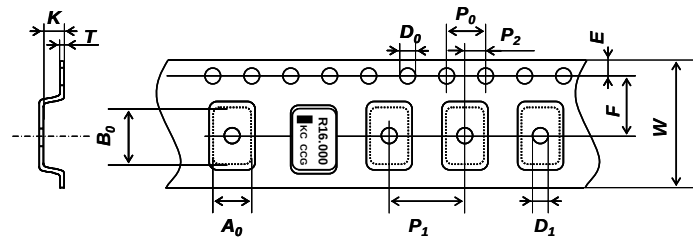


• Available reflow times: Maximum twice  
**Fig.5 Reflow profile (Lead Free)**

### 8-1. Soldering Iron Conditions

- Tip temperature of soldering iron:  $380^{\circ}C \pm 5^{\circ}C$ , Soldering time: 3sec+1/-0sec
- Numbers of soldering iron: Maximum twice as one time for 4 pads

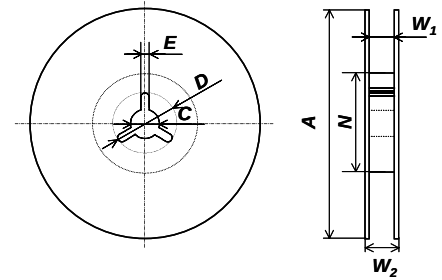
## 9. Taping Specifications



Unit: (mm)

| Symbol     | $A_0$         | $B_0$            | $W$            | $F$              | $E$            |
|------------|---------------|------------------|----------------|------------------|----------------|
| Dimensions | $3.7 \pm 0.1$ | $5.5 \pm 0.1$    | $12.0 \pm 0.3$ | $5.5 \pm 0.05$   | $1.75 \pm 0.1$ |
| Symbol     | $P_1$         | $P_2$            | $P_0$          | $D_0$            | $T$            |
| Dimensions | $8.0 \pm 0.1$ | $2.0 \pm 0.05$   | $4.0 \pm 0.1$  | $1.5 \pm 0.1/-0$ | $0.3 \pm 0.05$ |
| Symbol     | $K$           | $D_1$            |                |                  |                |
| Dimensions | $1.4 \pm 0.1$ | $1.5 \pm 0.1/-0$ |                |                  |                |

**Fig.6 Emboss Carrier Tape**



Unit: (mm)

| Symbol     | $A$            | $N$            | $W_1$          |
|------------|----------------|----------------|----------------|
| Dimensions | $180 \pm 0/-3$ | $60 \pm 1/-0$  | $13.0 \pm 0.3$ |
| Symbol     | $W_2$          | $C$            | $D$            |
| Dimensions | $17.0 \pm 1.4$ | $13.0 \pm 0.2$ | $21.0 \pm 0.8$ |
| Symbol     | $E$            |                |                |
| Dimensions | $2.0 \pm 0.5$  |                |                |

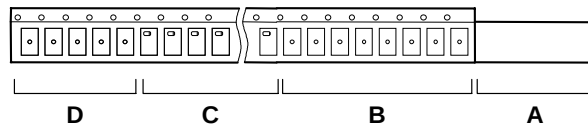
**Fig.7 Reel**

### 9-1. Taping Quantities

- The taping of per reel shall be packed 1,000 pcs.
- The parts shall be contained continuously in the pocket.

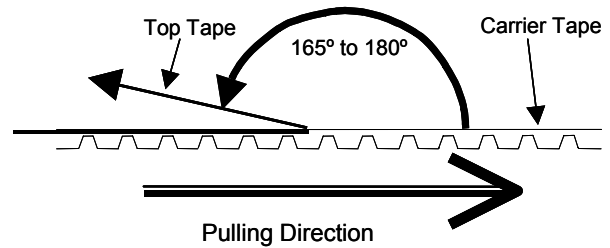
### 9-2. Leader and Blank Pockets

- The package shall be consisted of leader, blank pockets and loaded pocket as follows "Fig. 8".
- The power of peeling strength between top tape and carrier tape shall be  $0.1N(10gf)$  to  $0.7N(70gf)$  as follows "Fig. 9".



- A) Leader
- B) Blank Pockets (40mm to 320mm)  
A+B: 500mm to 560mm
- C) Load Pockets
- D) Blank Pocket (40mm min)

**Fig.8 Packing Method**



**Fig.9 Peeling Strength**

### 9-3. Reel Label

The reel label shall be consisted as below. (Based on EIAJ C-3 format)

- |                         |                  |
|-------------------------|------------------|
| A) Customer Part Number | D) Shipping Date |
| B) Lot No.              | E) Vender Name   |
| C) Quantities           |                  |

### 9-4. Exterior Package Label

The oscillator shall be packed properly to avoid defect in transportation. The exterior package label shall be consisted as below.

- |                         |                  |
|-------------------------|------------------|
| A) Name of Customer     | E) Quantities    |
| B) P/O No.              | F) Shipping Date |
| C) Customer Part Number | G) Vender Name   |
| D) Lot No.              |                  |

## 10. Manufacturing Locations

This part is produced on the following both locations.

- KYOCERA Crystal Device PHILIPPINES, Inc. (Philippines)
- KYOCERA Crystal Device Corporation Nagano Okaya Plant (Japan)

## 11. The agreement of this specifications

If the something suspicious is that part of the contents of this specification, it shall be resolved by mutual deliberations.

## 12. Remarks on Usages

- A) Storage Conditions  
The parts shall be stored in temperature range of -5 to +40°C, humidity 40 to 60% RH, and avoid direct sunlight. Then the parts shall be used within 6 months.
- B) Handling Conditions  
Although the part has protection circuit against static electricity, when excess static electricity is applied, the inside IC may get damaged.  
Before mounting on the PCB, please make sure the direction of the part is correct. Otherwise the part of temperature will increase. And also the part will have some damages.  
Please do not use the parts under the unfavorable condition such as beyond specified range in this specification.  
Please do not use the parts under the condition, in the water or in the salt water also environment of dew or harmful gas.
- C) Soldering Conditions  
This product can respond to the general Pb-free reflow profile. The wave soldering can not be supported.
- D) Washing Conditions  
Ultra sonic cleaning is available. However there is a possibility that Crystal in the part may cause damaged under certain condition. Therefore please test before using.  
After washing, please dry the parts completely. Otherwise water drops between the parts and PCB may cause migration.

In case of using this part without above precaution, Kyocera is unable to guarantee the specific characteristics.

