

# Ceramic Resonators(SMD)

## CCR Series

Conformity to RoHS Directive

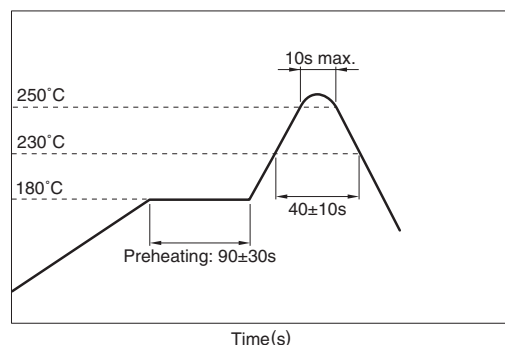
### FEATURES

- The CCR series are thin-type ceramic chip resonators. Thickness shear mode or 3rd over-tone thickness expansion mode element are used for both the 4.0 to 11.0MHz band and the 16.0 to 50.0MHz band.
- Products with built-in loading capacitance have piezoelectric elements that are mounted onto a capacity-forming dielectric substrate. This eliminates the need for external capacitors, thus simplifying circuit requirements.
- Optimization of the temperature characteristics of both the piezoelectric element and dielectric materials has resulted in stable oscillating frequency.
- Corresponds to reflow soldering. Moreover, it is possible to correspond Pb-free soldering.(260°C,10sec. max.) Packaging style is emboss taping.
- Setting or matching of oscillating frequency which correspond to new models, application IC or custom IC are also available, please contact TDK.

### TEMPERATURE RANGES

|                   |              |
|-------------------|--------------|
| Operating/Storage | -40 to +85°C |
|-------------------|--------------|

### RECOMMENDED SOLDERING CONDITIONS REFLOW SOLDERING



### PRODUCT IDENTIFICATIONS

|     |      |      |     |     |     |     |     |
|-----|------|------|-----|-----|-----|-----|-----|
| CCR | 20.0 | MXC7 | □□□ | □□  | □□  | □□  | T□  |
| (1) | (2)  | (3)  | (4) | (5) | (6) | (7) | (8) |

#### (1) Series name

|     |                        |
|-----|------------------------|
| CCR | Ceramic resonator(SMD) |
|-----|------------------------|

#### (2) Oscillating frequency

#### (3) Production type and dimensions

| Symbol | Oscillating frequency range (MHz) | Loading capacitors | Dimensions L×W (mm) |
|--------|-----------------------------------|--------------------|---------------------|
| MUC8   | 4.0 to 7.99                       | Internal           | 4.0×2.0             |
| MXC8   | 8.0 to 11.0                       | Internal           | 3.2×1.3             |
| MX7    | 16.0 to 50.0                      | External           | 2.5×2.0             |
| MXC7   | 16.0 to 50.0                      | Internal           | 2.5×2.0             |
| MYC7   | 24.0 to 50.0                      | Internal           | 2.0×1.6             |

#### (4) Initial oscillating frequency tolerance

| Symbol | MUC8        | MXC8  | MXC7/MX7/MYC7 |
|--------|-------------|-------|---------------|
| Non    | ±0.5%       | ±0.5% | ±0.5%         |
| A      | ±0.3%       | ±0.3% | ±0.3%         |
| A2     | —           | —     | ±0.2%         |
| A15    | —           | —     | ±0.15%        |
| Others | Custom made |       |               |

#### (5) Oscillating frequency correlation

|        |                                  |
|--------|----------------------------------|
| Non    | Non correlation for TDK standard |
| F      | Custom made                      |
| F1     | Custom made                      |
| F2     | Custom made                      |
| Others | Custom made                      |

#### (6) Built-in loading capacitance

| Symbol | MUC8           | MXC8           | MXC7            |
|--------|----------------|----------------|-----------------|
| Non    | Standard(27pF) | Standard(18pF) | Standard(8/9pF) |
| J      | —              | —              | 11.5pF          |
| J1     | —              | —              | 6/4pF           |
| J2     | —              | —              | 2pF             |
| Others | Custom made    |                |                 |

#### (7) Product's thickness

|        |             |
|--------|-------------|
| Non    | Standard    |
| N      | Custom made |
| N1     | Custom made |
| N2     | Custom made |
| Others | Custom made |

#### (8) Taping style

| Symbol | MUC8                             | MXC8                             | MXC7/MX7                          | MYC7                             |
|--------|----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
| T      | 2,000pieces/<br>reel<br>(ø180mm) | 2,000pieces/<br>reel<br>(ø180mm) | 2,000pieces/<br>reel<br>(ø180mm)  | —                                |
| T1     | —                                | —                                | 3,000pieces/<br>reel<br>(ø180mm)  | 3,000pieces/<br>reel<br>(ø180mm) |
| T2     | —                                | —                                | 4,000pieces/<br>reel<br>(ø180mm)  | —                                |
| T3     | —                                | —                                | 10,000pieces/<br>reel<br>(ø330mm) | —                                |

- Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

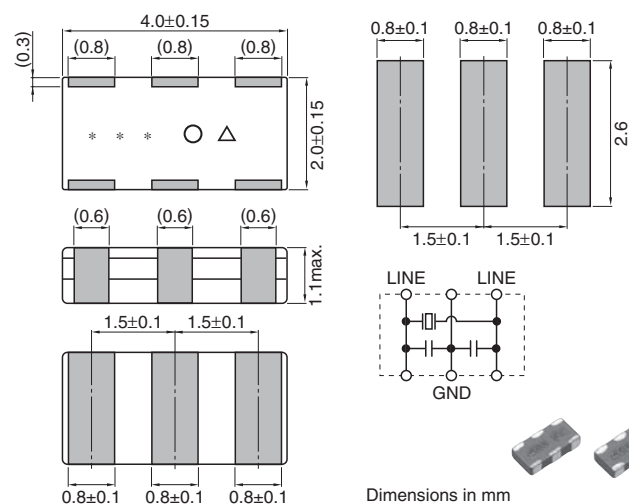
- All specifications are subject to change without notice.

## SHAPES AND DIMENSIONS/RECOMMENDED PC BOARD PATTERNS

### MUC8 TYPE

FUNDAMENTAL WAVE MODE: 4.0 to 7.99MHz/

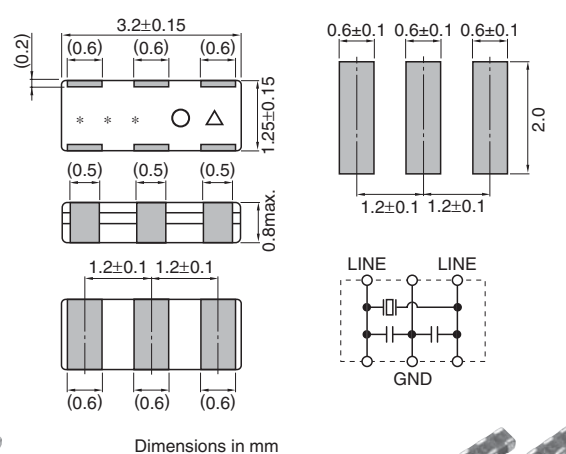
BUILT-IN LOAD CAPACITY



### MXC8 TYPE

FUNDAMENTAL WAVE MODE: 8.0 to 11.00MHz/

BUILT-IN LOAD CAPACITY



### MUC8 TYPE

| Part No.     | Oscillating frequency Fosc<br>(MHz) | Resonant impedance Z <sub>0</sub><br>(Ω)max. | Initial Fosc tolerance*<br>(%)max. | Built-in load capacity(pF) |                 | T<br>(mm)max. |
|--------------|-------------------------------------|----------------------------------------------|------------------------------------|----------------------------|-----------------|---------------|
|              |                                     |                                              |                                    | CL <sub>1</sub>            | CL <sub>2</sub> |               |
| CCR4.0MUC8T  | 4.000                               | 40                                           | ±0.5/0.3                           | 27                         | 27              | 1.1           |
| CCR4.19MUC8T | 4.194                               | 40                                           | ±0.5/0.3                           | 27                         | 27              | 1.1           |
| CCR4.91MUC8T | 4.915                               | 40                                           | ±0.5/0.3                           | 27                         | 27              | 1.1           |
| CCR5.0MUC8T  | 5.000                               | 40                                           | ±0.5/0.3                           | 27                         | 27              | 1.1           |
| CCR6.0MUC8T  | 6.000                               | 40                                           | ±0.5/0.3                           | 27                         | 27              | 1.1           |

• These are representative characteristics. Oscillating frequencies and built-in load capacity values other than these shown here can be supported.

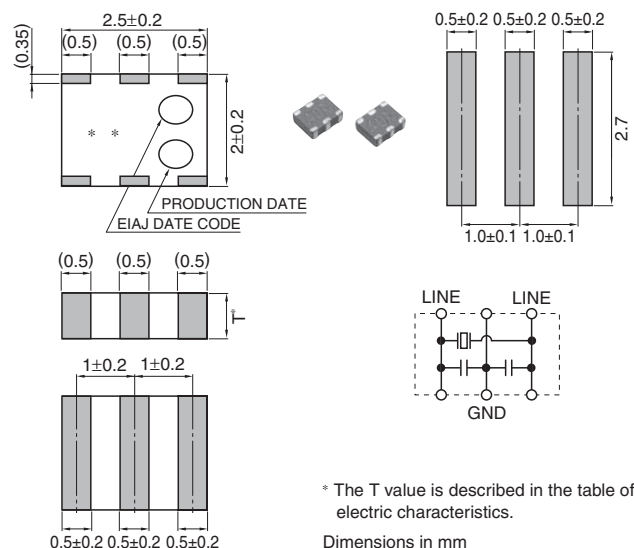
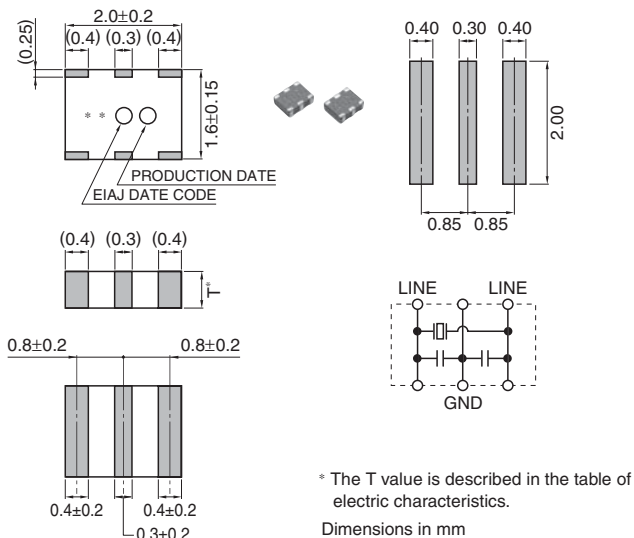
\* ±0.5% is standard. Also available for custom made, please contact TDK.

### MXC8 TYPE

| Part No.     | Oscillating frequency Fosc<br>(MHz) | Resonant impedance Z <sub>0</sub><br>(Ω)max. | Initial Fosc tolerance*<br>(%)max. | Built-in load capacity(pF) |                 | T<br>(mm)max. |
|--------------|-------------------------------------|----------------------------------------------|------------------------------------|----------------------------|-----------------|---------------|
|              |                                     |                                              |                                    | CL <sub>1</sub>            | CL <sub>2</sub> |               |
| CCR8.0MXC8T  | 8.000                               | 40                                           | ±0.5/0.3                           | 18                         | 18              | 0.8           |
| CCR8.38MXC8T | 8.380                               | 40                                           | ±0.5/0.3                           | 18                         | 18              | 0.8           |
| CCR10.0MXC8T | 10.000                              | 40                                           | ±0.5/0.3                           | 18                         | 18              | 0.8           |
| CCR11.0MXC8T | 11.000                              | 40                                           | ±0.5/0.3                           | 18                         | 18              | 0.8           |

• These are representative characteristics. Oscillating frequencies and built-in load capacity values other than these shown here can be supported.

\* ±0.5% is standard. Also available for custom made, please contact TDK.

**MXC7 TYPE**
**THIRD HARMONIC MODE: 16.0 to 50.0MHz/  
BUILT-IN LOAD CAPACITY**
**MYC7 TYPE**
**THIRD HARMONIC MODE: 24.0 to 50.0MHz/  
BUILT-IN LOAD CAPACITY**
**MXC7 TYPE**

| Part No.      | Oscillating frequency Fosc (MHz) | Resonant impedance Z <sub>0</sub> (Ω) max. | Initial Fosc tolerance* (%) max. | Built-in load capacity(pF) |                 | T (mm)  |
|---------------|----------------------------------|--------------------------------------------|----------------------------------|----------------------------|-----------------|---------|
|               |                                  |                                            |                                  | CL <sub>1</sub>            | CL <sub>2</sub> |         |
| CCR16.0MXC7T  | 16.000                           | 70                                         | ±0.5/0.3/0.15                    | 10.0                       | 10.0            | 1.1±0.2 |
| CCR16.93MXC7T | 16.934                           | 70                                         | ±0.5/0.3/0.15                    | 9.0                        | 9.0             | 1.1±0.2 |
| CCR18.0MXC7T  | 18.000                           | 70                                         | ±0.5/0.3/0.15                    | 9.0                        | 9.0             | 1±0.2   |
| CCR20.0MXC7T  | 20.000                           | 40                                         | ±0.5/0.3/0.15                    | 9.0                        | 9.0             | 1±0.2   |
| CCR22.58MXC7T | 22.580                           | 40                                         | ±0.5/0.3/0.15                    | 9.0                        | 9.0             | 1±0.2   |
| CCR24.0MXC7T  | 24.000                           | 40                                         | ±0.5/0.3/0.15                    | 9.0                        | 9.0             | 1±0.2   |
| CCR25.0MXC7T  | 25.000                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.9±0.2 |
| CCR30.0MXC7T  | 30.000                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.9±0.2 |
| CCR32.0MXC7T  | 32.000                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.8±0.2 |
| CCR33.33MXC7T | 33.333                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.8±0.2 |
| CCR33.86MXC7T | 33.868                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.8±0.2 |
| CCR34.57MXC7T | 34.570                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.8±0.2 |
| CCR40.0MXC7T  | 40.000                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.8±0.2 |
| CCR48.0MXC7T  | 48.000                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.8±0.2 |
| CCR50.0MXC7T  | 50.000                           | 40                                         | ±0.5/0.3/0.15                    | 8.0                        | 8.0             | 0.8±0.2 |

• These are representative characteristics. Oscillating frequencies and built-in load capacity values other than these shown here can be supported.

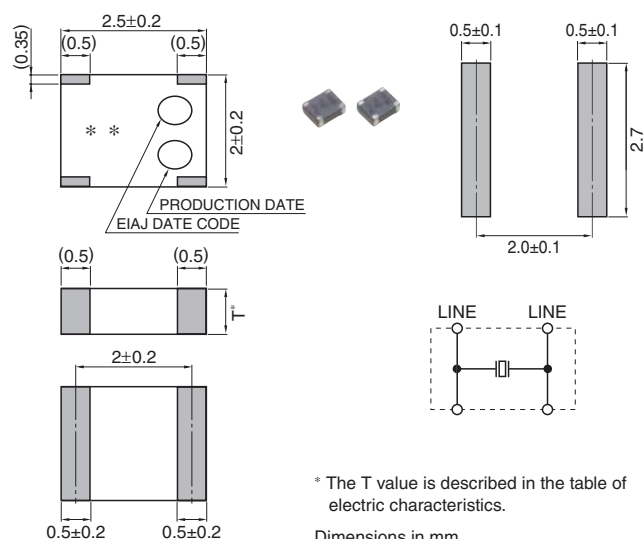
\* ±0.5% is standard. Also available for custom made, please contact TDK.

**MYC7 TYPE**

| Part No.       | Oscillating frequency Fosc (MHz) | Resonant impedance Z <sub>0</sub> (Ω) max. | Initial Fosc tolerance* (%) max. | Built-in load capacity(pF) |                 | T (mm)   |
|----------------|----------------------------------|--------------------------------------------|----------------------------------|----------------------------|-----------------|----------|
|                |                                  |                                            |                                  | CL <sub>1</sub>            | CL <sub>2</sub> |          |
| CCR24.0MYC7T1  | 24.000                           | 40                                         | ±0.5/0.3/0.15                    | 7.0                        | 7.0             | 0.9±0.1  |
| CCR25.0MYC7T1  | 25.000                           | 40                                         | ±0.5/0.3/0.15                    | 7.0                        | 7.0             | 0.9±0.1  |
| CCR27.12MYC7T1 | 27.120                           | 40                                         | ±0.5/0.3/0.15                    | 7.0                        | 7.0             | 0.85±0.1 |
| CCR30.0MYC7T1  | 30.000                           | 40                                         | ±0.5/0.3/0.15                    | 7.0                        | 7.0             | 0.85±0.1 |
| CCR33.33MYC7T1 | 33.333                           | 40                                         | ±0.5/0.3/0.15                    | 7.0                        | 7.0             | 0.85±0.1 |
| CCR33.86MYC7T1 | 33.868                           | 40                                         | ±0.5/0.3/0.15                    | 7.0                        | 7.0             | 0.85±0.1 |
| CCR40.0MYC7T1  | 40.000                           | 40                                         | ±0.5/0.3/0.15                    | 7.0                        | 7.0             | 0.8±0.1  |
| CCR48.0MYC7T1  | 48.000                           | 40                                         | ±0.5/0.3/0.15                    | 7.0                        | 7.0             | 0.8±0.1  |

• These are representative characteristics. Oscillating frequencies and built-in load capacity values other than these shown here can be supported.

\* ±0.5% is standard. Also available for custom made, please contact TDK.

**MX7 TYPE****THIRD HARMONIC MODE: 16.0 to 50.0MHz/EXTERNAL LOAD CAPACITY****MX7 TYPE**

| Part No.     | Oscillating frequency Fosc<br>(MHz) | Resonant impedance Z <sub>0</sub><br>(Ω)max. | Initial Fosc tolerance*<br>(%)max. | Built-in load capacity(pF) |                 | T<br>(mm) |
|--------------|-------------------------------------|----------------------------------------------|------------------------------------|----------------------------|-----------------|-----------|
|              |                                     |                                              |                                    | CL <sub>1</sub>            | CL <sub>2</sub> |           |
| CCR16.0MX7T  | 16.000                              | 70                                           | ±0.5/0.3/0.15                      | —                          | —               | 1.1±0.2   |
| CCR16.93MX7T | 16.934                              | 70                                           | ±0.5/0.3/0.15                      | —                          | —               | 1.1±0.2   |
| CCR18.0MX7T  | 18.000                              | 70                                           | ±0.5/0.3/0.15                      | —                          | —               | 1±0.2     |
| CCR20.0MX7T  | 20.000                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 1±0.2     |
| CCR22.58MX7T | 22.580                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 1±0.2     |
| CCR24.0MX7T  | 24.000                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 1±0.2     |
| CCR25.0MX7T  | 25.000                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.9±0.2   |
| CCR30.0MX7T  | 30.000                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.9±0.2   |
| CCR32.0MX7T  | 32.000                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.8±0.2   |
| CCR33.33MX7T | 33.333                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.8±0.2   |
| CCR33.86MX7T | 33.868                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.8±0.2   |
| CCR34.57MX7T | 34.570                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.8±0.2   |
| CCR40.0MX7T  | 40.000                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.8±0.2   |
| CCR48.0MX7T  | 48.000                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.8±0.2   |
| CCR50.0MX7T  | 50.000                              | 40                                           | ±0.5/0.3/0.15                      | —                          | —               | 0.8±0.2   |

• These are representative characteristics. Oscillating frequencies and built-in load capacity values other than these shown here can be supported.

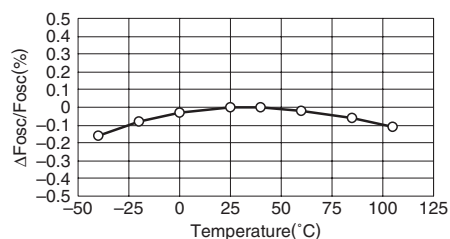
\* ±0.5% is standard. Also available for custom made, please contact TDK.

## TYPICAL ELECTRICAL CHARACTERISTICS

### OSCILLATING FREQUENCY DRIFT OVER TEMPERATURE

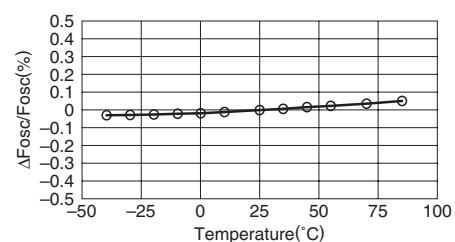
MUC8/MXC8:  $\pm 0.3\%$ /-40 to +85°C(Standard)

CCR8.0MXC8



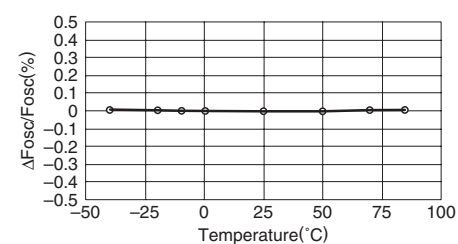
MXC7:  $\pm 0.2\%$ /-40 to +85°C(Standard)

CCR48.0MXC7



MYC7:  $\pm 0.2\%$ /-40 to +85°C(Standard)

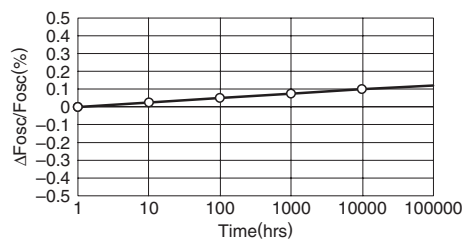
CCR48.0MYC7T1



### OSCILLATING FREQUENCY AGING

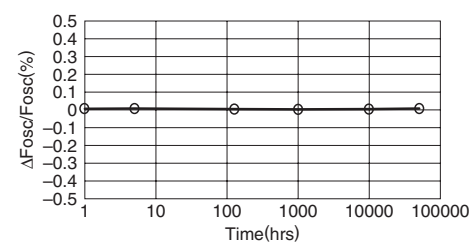
MUC8/MXC8:  $\pm 0.2\%$ /10years(Standard)

CCR8.0MXC8



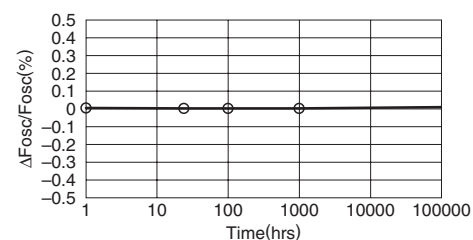
MXC7:  $\pm 0.1\%$ /10years(Standard)

CCR48.0MXC7

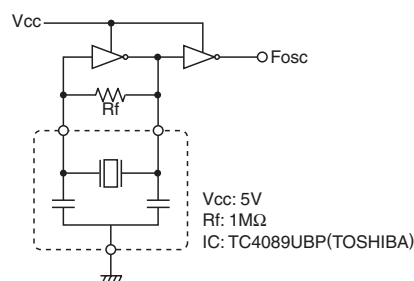


MYC7:  $\pm 0.1\%$ /10years(Standard)

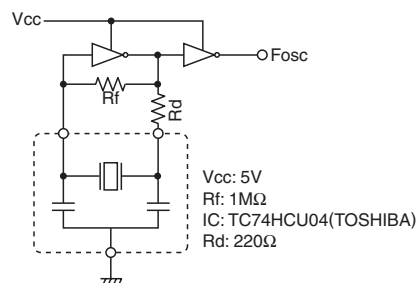
CCR48.0MYC7T1



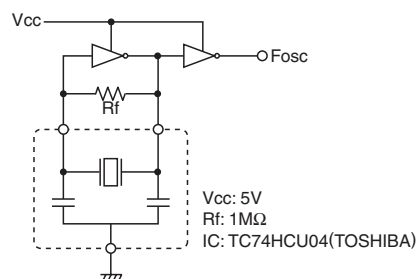
# **OSCILLATING FREQUENCY-TEMPERATURE CHARACTERISTIC MEASURING CIRCUIT** **MUC8/MXC8 TYPE 4.0 to 9.99MHz**



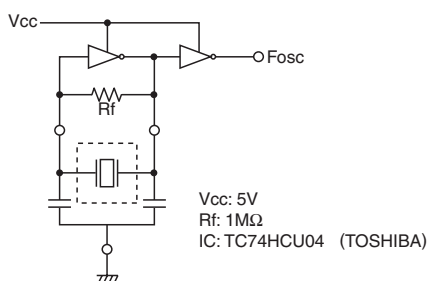
## **MXC8 TYPE 10.0 to 11.0MHz**



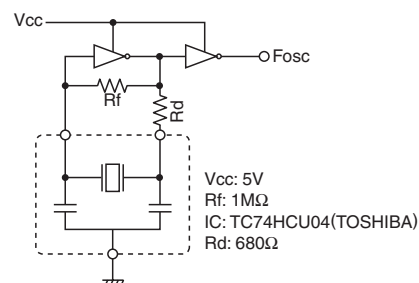
## **MXC7 TYPE 16.0 to 50.0MHz**



## **MX7 TYPE 16.0 to 50.0MHz**



## **MYC7 TYPE 24.0 to 50.0MHz**



## **RELIABILITY AND TEST CONDITIONS**

The following test items are satisfied.

- (1) Oscillating frequency change: Within  $\pm 0.25\%$
- (2) Resonant resistance change: Within  $\pm 10\Omega$
- (3) Appearance; serious abnormalities not to exist.

| Test items                  | Test conditions                                                                                                             |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Low temperature storage     | Temperature: $-40\pm 3^{\circ}\text{C}$<br>Time: 1000h                                                                      |
| High temperature storage    | Temperature: $+85\pm 2^{\circ}\text{C}$<br>Time: 1000h                                                                      |
| Loading humidity resistance | Humidity: 90 to 95(%)RH<br>Temperature: $60\pm 2^{\circ}\text{C}$<br>Time: 1000h                                            |
| Thermal shock               | $-40^{\circ}\text{C}$ (30min), $85^{\circ}\text{C}$ (30min) x 100 cycles                                                    |
| Soldering heat resistance   | Solder temperature: peak $260^{\circ}\text{C}$ , 10s<br>reflow                                                              |
| Drop                        | Drop 3 times onto the concrete from a height of 1m                                                                          |
| Vibration                   | Frequency: $10 \leftrightarrow 55 \leftrightarrow 10\text{Hz/min}$<br>Amplitude: 1.5mm<br>X, Y and Z directions for 2h each |
| Board bend test             | Solder this product onto a glass epoxy board (L100×W40×T1.6mm), press it by up to 1mm in 1mm/s and keep it for 5sec.        |