



## CERAMIC RESONATOR (CERALOCK®)



Ceramic Resonator **CSA/CSB** Series (CERALOCK®)

### CERALOCK® with two leaded terminals.

The CSA and CSB series ceramic resonator owe their development to MURATA's innovative expert technologies and the application of mass production techniques typically utilized in the manufacture of piezoelectric ceramic components. Because of their high mechanical Q and consistent high quality, both the CSA and CSB series are ideally suited to microprocessor and remote control unit applications.

The CSA series is available in two types: one for MOS technology and the other for LS-TTL technology. The CSB series includes the thin and compact J type which is ideal in high-speed 4-bit microprocessor applications.

In addition, MURATA offers a special CERALOCK® version suitable for automatic insertion utilizing tape and reel and other packaging forms. For further information, please contact your local MURATA representative office or authorized distributor.



#### ■FEATURES

1. The series is stable over a wide temperature range and with respect to long-term aging.
2. The series comprises fixed, tuned, solid-state devices.
3. The resonators are miniature and light weight.
4. They exhibit excellent shock resistance performance.
5. Oscillating circuits requiring no adjustment can be designed by utilizing these resonators in conjunction with transistors or appropriate ICs.

#### ■APPLICATIONS

1. Square-wave and sine-wave oscillator.
2. Clock generator for microprocessors.
3. Tone Dialers and Pulse Dialers for telephone.
4. Remote control systems.
5. Automotive electronics (engine control, digital speed meters, etc.)



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### SPECIFICATIONS

| Item  | Type | CSA Series (for MOS)  |                  |                  |                   | CSA Series (for LS-TTL)  |                  |                  |                | CSB Series  |                |                 |
|---|------|---|------------------|------------------|-------------------|--|------------------|------------------|----------------|---|----------------|-----------------|
|   |      | CSA□MK  | CSA□MG           | CSA□MTZ          | CSA□MXZ040        | CSA□MK011  | CSA□MG011        | CSA□MTZ011       | CSA□MXZ011     | Not Washable  | Washable*7     |                 |
| Frequency Range                               |      | 1.26—<br>1.79MHz  | 1.80—<br>6.30MHz | 6.31—<br>13.0MHz | 13.01—<br>60.0MHz | 1.26—<br>1.79MHz   | 1.80—<br>6.30MHz | 6.31—<br>11.9MHz | 12.0—<br>30MHz | 375—<br>699kHz  | 190—<br>374kHz | 375—<br>1250kHz |
| Oscillation Frequency Initial Tolerance       |      | ±0.5%   |                  |                  |                   | ±0.5%  |                  |                  |                | ±2KHz   | ±1KHz          | ±0.5%           |
| Oscillation Frequency Temperature Stability*1 |      | ±0.3%   | ±0.5%            | ±0.3%            |                   | ±0.3%  | ±0.5%            | ±0.3%            |                | ±0.3%   |                |                 |
| Aging*2                                       |      | ±0.3%   | ±0.5%            | ±0.3%            |                   | ±0.3%  | ±0.5%            | ±0.3%            |                | ±0.5%   |                |                 |
| Oscillation Frequency Measuring Circuit       |      | <p>IC :1/6CD4069UBE X2*5<br/>V<sub>DD</sub> :5V (MTZ Series:12V)<br/>X :CERALOCK®<br/>C1,C2 :30pF*6</p> |                  |                  |                   | <p>IC :1/6SN74LS04 X2<br/>V<sub>CC</sub> :5V<br/>X :CERALOCK®<br/>C1,C2 :Load Capacitors*3<br/>Rt :2.2—4.7Ω<br/>Rb :2.2—22kΩ</p> |                  |                  |                | <p>IC :1/6CD4069UBE X2<br/>V<sub>DD</sub> :5V<br/>X :CERALOCK®<br/>C1,C2 :Load Capacitors*3<br/>Rd :5.6kΩ*4</p> |                |                 |

- \*1 At -20°C to +80°C
- \*2 For 10 years at room temperature
- \*3 Values vary according to frequency. Please contact us for details.
- \*4 700—1250KHz (J Type) only.
- \*5 TC74HCU04 is used as the standard circuit for the MXZ040 series. Please contact us for details.

- \*6 For the MXZ040 series, the value changes according to frequency.
- \*7 Washing the resonator is allowed. However, temperature, time and other washing conditions should be evaluated to confirm that stable electrical characteristics are maintained.

### DIMENSIONS

| Standard Products | Frequency   | Not Washable |                    | Standard Products |                    | Washable    |                    |
|-------------------|-------------|--------------|--------------------|-------------------|--------------------|-------------|--------------------|
|                   |             | Part Number  | Dimensions (in mm) | Part Number       | Dimensions (in mm) | Part Number | Dimensions (in mm) |
| Standard Products | 375—429kHz  | CSB□P        |                    | 375—429kHz        | CSB□J*             |             |                    |
|                   | 430—509kHz  | CSB□E        |                    | 430—519kHz        | CSB□J*             |             |                    |
| Standard Products | 510—699kHz  | CSB□P        |                    | 520—699kHz        | CSB□J*             |             |                    |
|                   | 700—1250kHz | CSB□J*       |                    | 700—1250kHz       | CSB□J*             |             |                    |
| Standard Products | 190—249kHz  | CSB□D        |                    | 190—249kHz        | CSB□D              |             |                    |
|                   | 250—374kHz  | CSB□D        |                    | 250—374kHz        | CSB□D              |             |                    |
| Standard Products | 375—429kHz  | CSB□J*       |                    | 375—429kHz        | CSB□J*             |             |                    |
|                   | 430—519kHz  | CSB□J*       |                    | 430—519kHz        | CSB□J*             |             |                    |
| Standard Products | 510—699kHz  | CSB□J*       |                    | 510—699kHz        | CSB□J*             |             |                    |
|                   | 700—1250kHz | CSB□J*       |                    | 700—1250kHz       | CSB□J*             |             |                    |

\* Please consult MURATA regarding ultrasonic cleaning conditions to avoid possible damage during ultrasonic cleaning.



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| Frequency          | 1.26—1.79MHz    | 1.80—2.44MHz              | 2.45—6.30kHz              | 6.31—13.00MHz                    | 12.00—32.00kHz                                  | 32.01—60.00MHz                                  |
|--------------------|-----------------|---------------------------|---------------------------|----------------------------------|---|---|
| Part Number        | CSA□MK*         | CSA□MG                    | CSA□MG                    | CSA□MTZ                          | CSA□MXZ   | CSA□MXZ   |
| Oscillation Mode*  | Shear Vibration | Thickness Shear Vibration | Thickness Shear Vibration | Thickness Longitudinal Vibration | Thickness Longitudinal Vibration (3rd OVERTONE) | Thickness Longitudinal Vibration (3rd OVERTONE) |
| Dimensions (in mm) |                 |                           |                           |                                  |   |   |

\*The CSA□MK type is not washable.

### THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION

