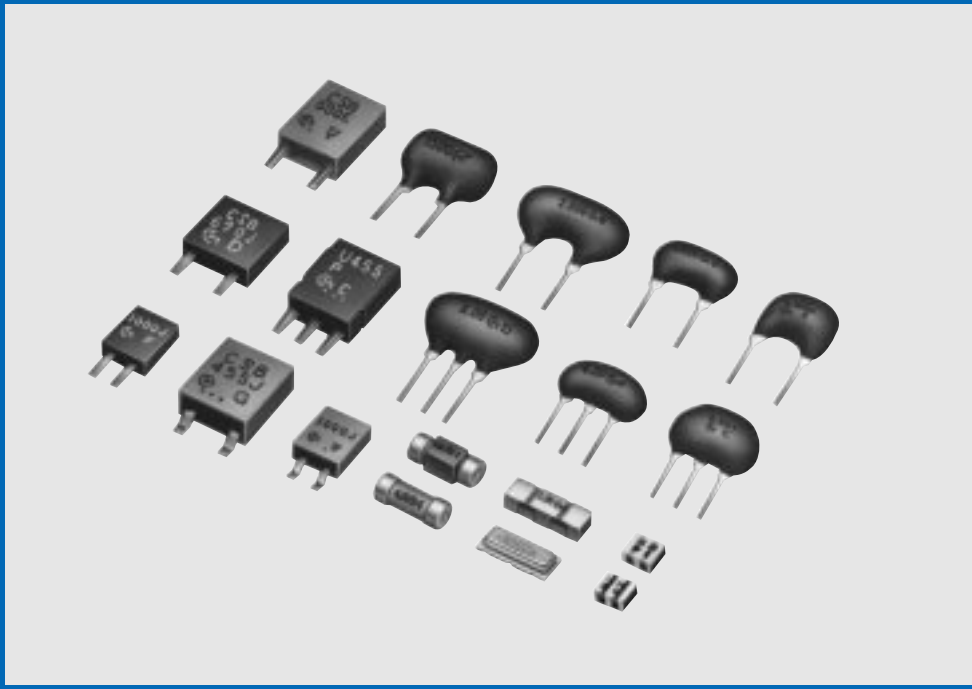
CERAMIC RESONATOR (CERALOCK®)

CERAMIC RESONATOR (CERALOCK®)



muRata Innovator in Electronics

Murata
Manufacturing Co., Ltd.

Cat.No.P16E-10

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*Available in several standard frequencies.

*CSACS□MTA/MXA Series, CSTCS□MTA/MXA Series shall be applied for automotive use.

■NOTICE

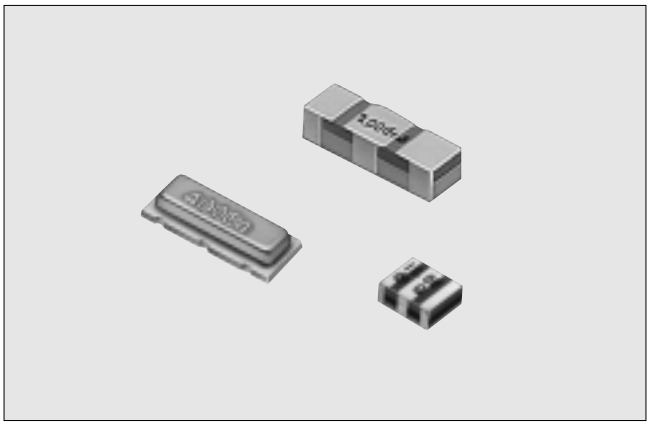
- Unstable oscillation or oscillation stoppage might happen when CERALOCK® is used in improper way in conjunction with ICs. We are happy to evaluate the application circuit to avoid this for you.
- Oscillation frequency of our standard CERALOCK® is adjusted with our standard measuring circuit. There could be slight shift is frequency if other types of IC are used. When you require exact oscillation frequency in your application, we can adjust it with your specified circuit.
- Please consult with us regarding ultrasonic cleaning conditions to avoid possible damage during ultrasonic cleaning.

CERAMIC RESONATOR

Chip Ceramic Resonator **CSTC/CSTCC/CSTCV** Series

Chip CERALOCK® with built-in load capacitance in an extremely small package.

MURATA's package technology expertise has enabled the development of the Chip CERALOCK® with built-in load capacitance.
High-density mounting can be realized because of the small package and the elimination of the need for an external load capacitor.



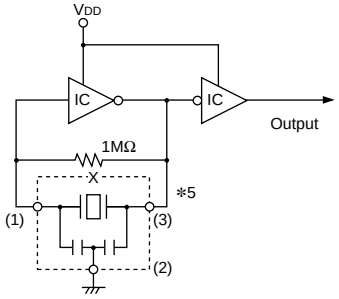
■FEATURES

1. Oscillation circuits do not require external load capacitors.
2. The series is available in a wide frequency range.
3. The resonators are extremely small and have a low profile.
4. No adjustment is necessary for oscillation circuits.

■APPLICATIONS

1. Clock oscillators for microprocessors.
2. Electronic control circuits for small electronic equipment such as hand held movie.
3. Audio-visual applications (Camcorder, Remote Controller, etc.)
4. Office automation equipments (DVD, CD-ROM, HDD, FDD, etc.)
5. Automotive electronics.(CSTC/CSTCC series)
6. Dual Tone Multi Frequency (DTMF) generator for cordless telephones.

■SPECIFICATIONS

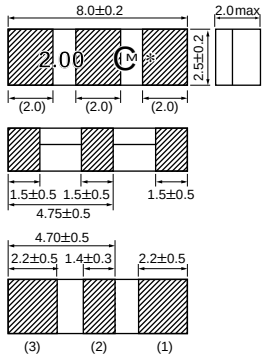
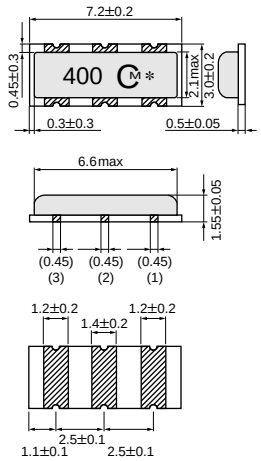
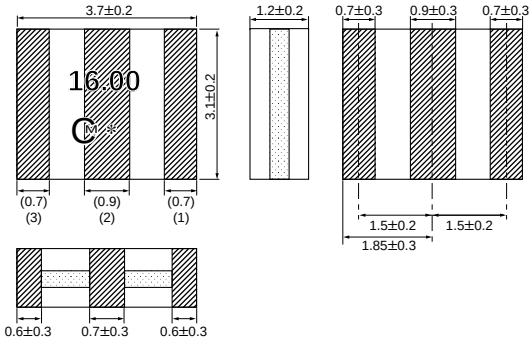
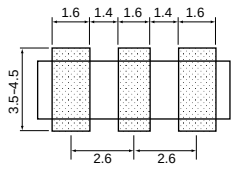
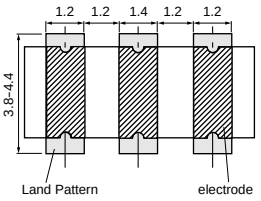
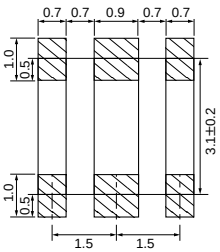
Type / Item	CSTC Series	CSTCC Series	CSTCV Series	
	CSTC□MG	CSTCC□MG	CSTCV□MTJ*6	CSTCV□MXJ040*6
Frequency Range	2.00–3.49MHz	3.50–10.00MHz*1	10.01–13.00MHz	13.50–60.00MHz
Oscillation Frequency Initial Tolerance	±0.5%	±0.5%	±0.5%	±0.5%
Oscillation Frequency Temperature Stability*2	±0.3%	±0.3%	±0.4%	±0.3%
Aging*3	±0.3%	±0.3%	±0.3%	±0.3%
Oscillation Frequency Measuring Circuit	 IC :1/6CD4069UBEX2*4 VDD :5V (MTJ series:12V) X :Chip CERALOCK®			

*1 Available in several standard frequencies. (ex. 3.58, 3.64, 3.68, 3.84, 4.00, 4.19, 4.91, 5.00, 6.00, 8.00, 10.00MHz)
*2 At -20 to +80℃
*3 For 10 years at room temperature
*4 TC74HCU04 is used as the standard circuit for the MXJ040 series.
*5 If connected with incorrect orientation, the above specification may not be guaranteed.
*6 CSTCS series shall be recommended in automotive application.

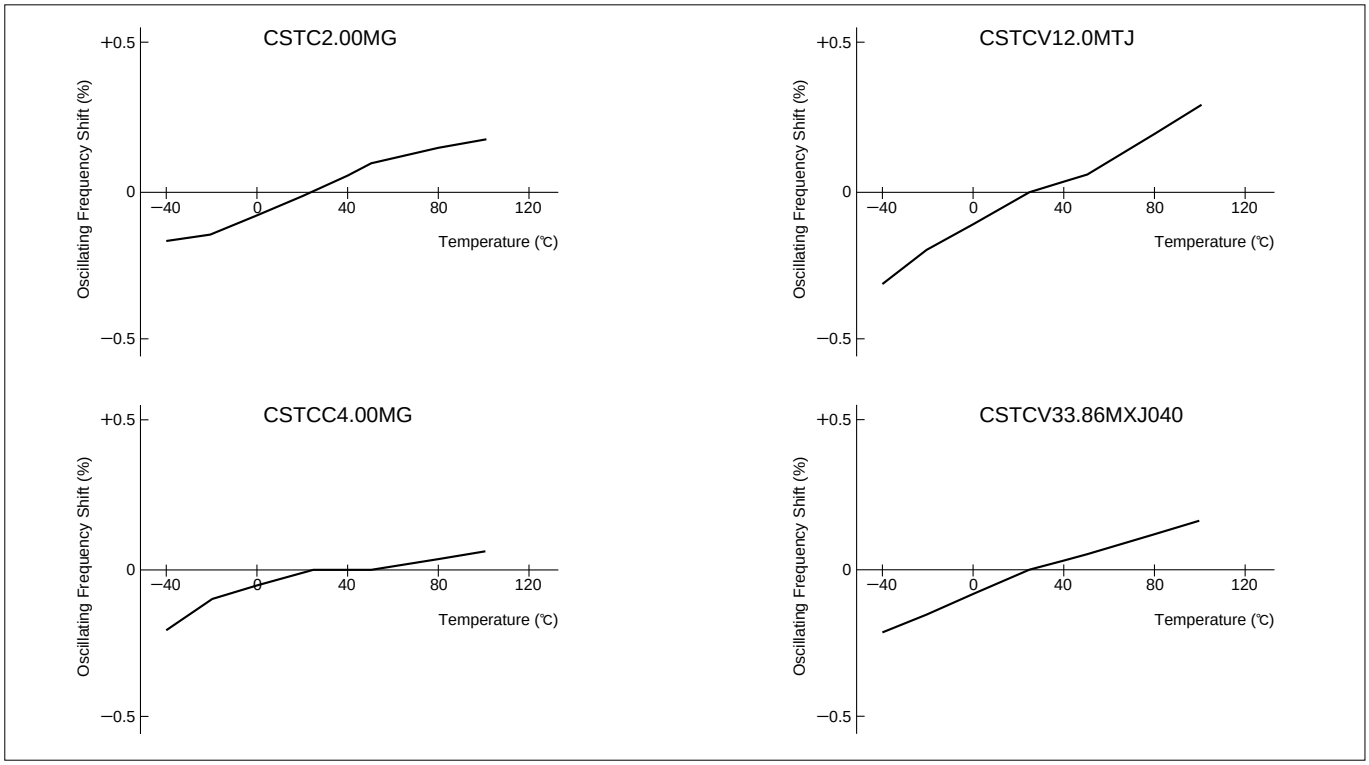
CERAMIC RESONATOR

Chip Ceramic Resonator **CSTC/CSTCC/CSTCV** Series

■DIMENSIONS/STANDARD LAND PATTERN (in mm tol.:±0.3mm)

Frequency	2.00–3.49MHz	3.50–10.00MHz	10.01–13.00MHz	13.50–60MHz
Type	CSTC□MG	CSTCC□MG	CSTCV□MTJ	CSTCV□MXJ040
Dimensions			 ∗Thickness varies with frequencies.	
Standard Land Pattern				

■THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION

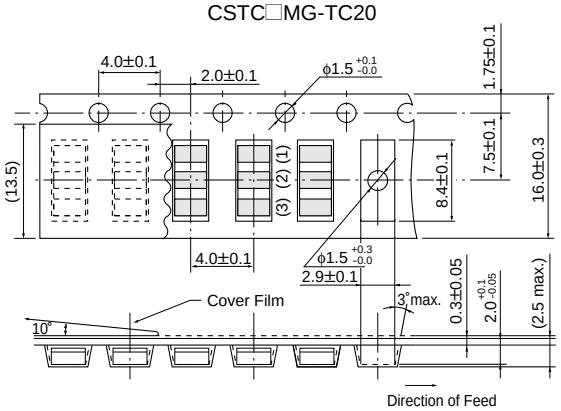


CERAMIC RESONATOR

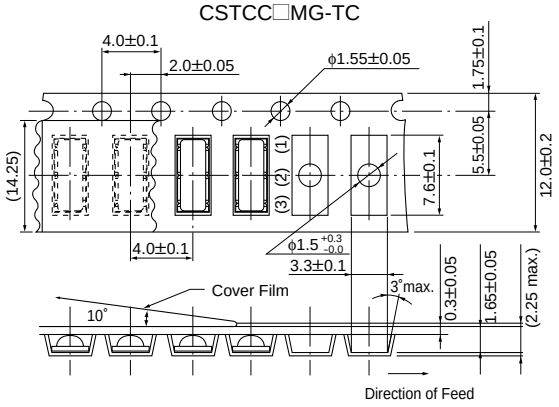
Chip Ceramic Resonator **CSTC/CSTCC/CSTCV** Series

■DIMENSIONS OF PLASTIC TAPE

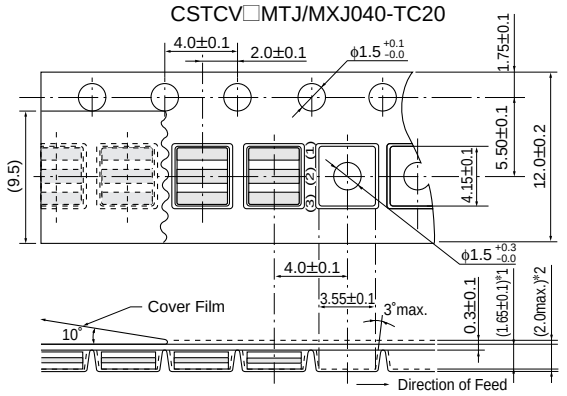
CSTC□MG-TC20



CSTCC□MG-TC



CSTCV□MTJ/MXJ040-TC20



*1, *2 : Dimensions varies with product thickness of CERALOCK®

(in mm)

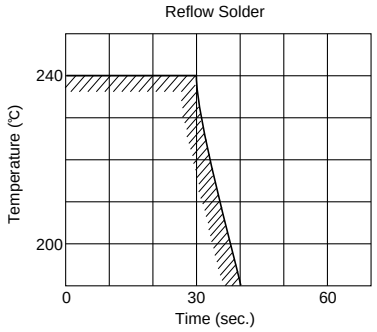
■APPLICATIONS

1. Soldering Conditions

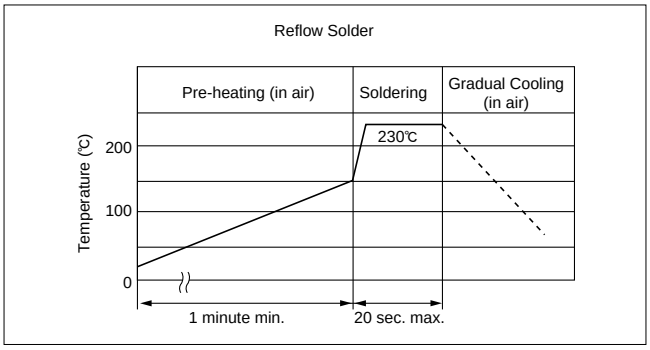
●Soldering Temperature and Time

Solder within the temperature and time combinations illustrated by the slanted lines in the following graph.
If soldering is repeated, please note that the allowed time is the accumulated time.

Solder: 6×4 Solder



●Standard Soldering Conditions



●Soldering Method

Soldering conditions : Soldering iron temperature 270℃
Soldering time less than 3 seconds

2. Cleaning Conditions

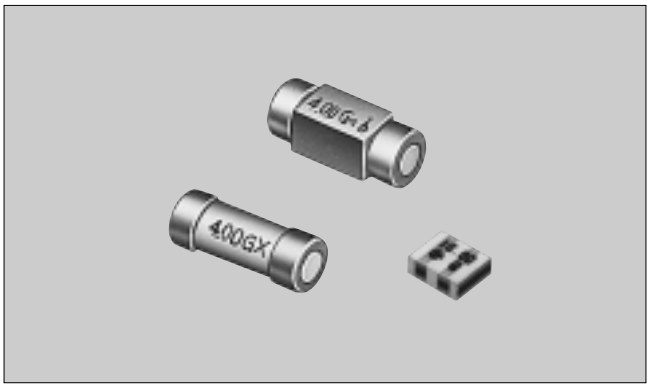
Please contact us concerning cleaning method before use. For protection of ozone layer, we also investigate the non-ODC cleaning process for our devices. For more details, please contact us before use.

CERAMIC RESONATOR

Chip Ceramic Resonator **CSAC/CSACV** Series

Wide range of chip CERALOCK® is now available.

This diverse series owes its development to MURATA's package technology expertise and original mass production techniques. It enables high-density mounting and further miniaturization of electronic equipment.



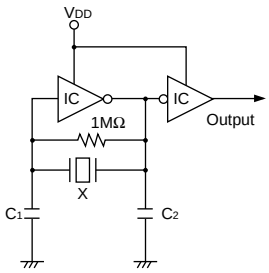
■FEATURES

1. The series is available in a wide frequency range.
2. The resonators are extremely small and have a low profile (CSACV series).
3. No adjustment is neccesary for oscillation circuits.

■APPLICATIONS

1. Clock oscillators for microprocessors.
2. Electronic control circuits for small electronic equipment.
3. Automotive electronics (CSAC series)
4. DTMF generators for cordless telephones.

■SPECIFICATIONS

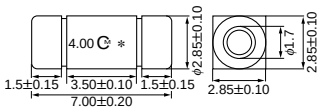
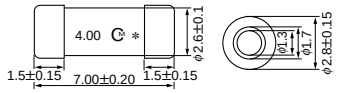
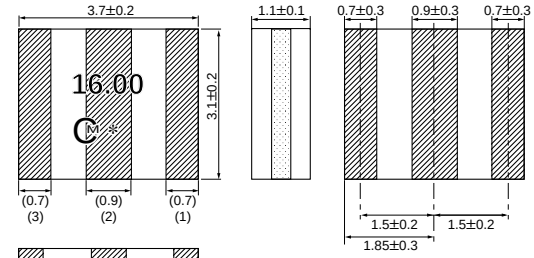
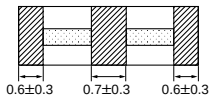
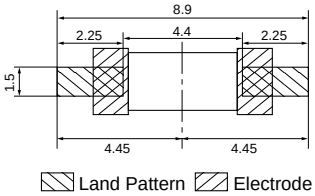
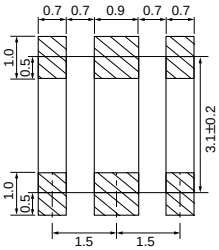
Type / Item	CSAC Series	CSACV Series	
	CSAC□MGC/MGCM	CSACV□MTJ*4	CSACV□MXJ040*4
Frequency Range	1.80–6.00MHz	8.00–13.00MHz	13.50–60.00MHz
Oscillation Frequency Initial Tolerance	±0.5%	±0.5%	±0.5%
Oscillation Frequency Temperature Stability*1	±0.3%	±0.5%	±0.3%
Aging*2	±0.3%	±0.5%	±0.3%
Oscillation Frequency Measuring Circuit	 IC :1/6CD4069UBEX2*3 VDD :5V (MTJ series:12V) X :Chip CERALOCK®		

*1 At -20 to +80℃
*2 For 10 years at room temperature
*3 TC74HCU04 is used as the standard circuit for the MXJ040 series.
*4 CSACS series shall be recommended in automotive application.

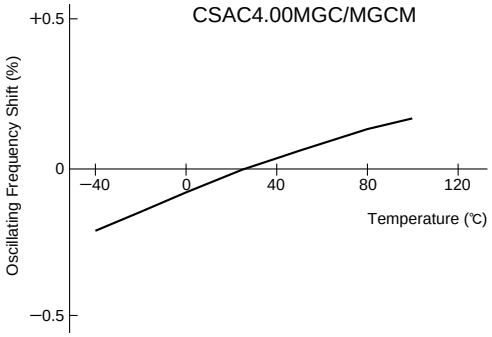
CERAMIC RESONATOR

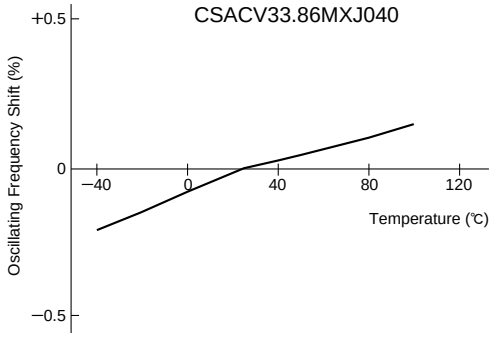
Chip Ceramic Resonator **CSAC/CSACV** Series

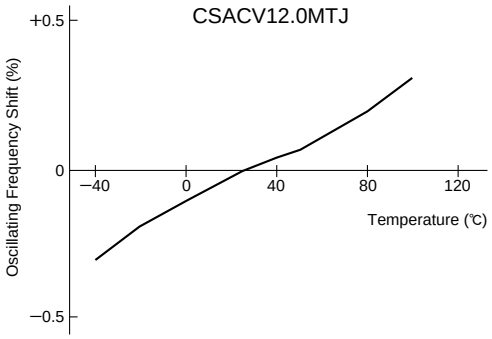
■DIMENSIONS/STANDARD LAND PATTERN (in mm)

Frequency	1.80–6.00MHz	8.01–13.00MHz	13.50–60.00MHz
Type	CSAC□MGC/MGCM	CSACV□MTJ	CSACV□MXJ040
Dimensions	(MGCM)  (MGC)  	  ∗Terminal (1) and (3) are interchangeable. Terminal (2) shall be soldered only to fix the resonator on to P.C.B.. Terminal (2) shall be electrically floating so it shall not be connected to anywhere. ∗Thickness varies with frequency.	
Standard Land Pattern	 	 	

■THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION





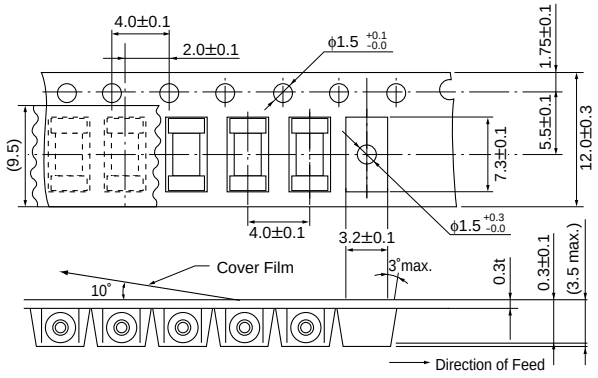


CERAMIC RESONATOR

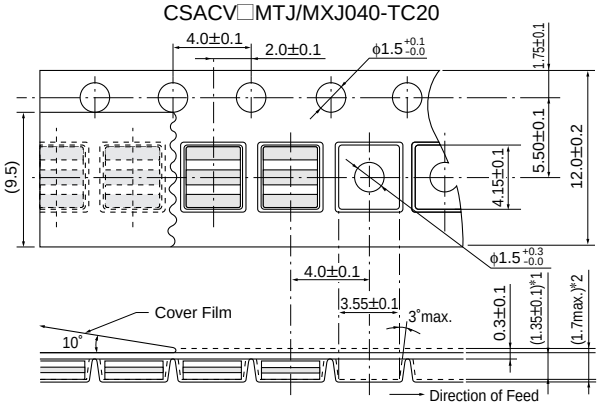
Chip Ceramic Resonator **CSAC/CSACV** Series

■DIMENSIONS OF PLASTIC TAPE

CSAC□MGC/MGCM-TC



CSACV□MTJ/MXJ040-TC20



*1, *2 : Dimensions varies with product thickness of CERALOCK®

(in mm)

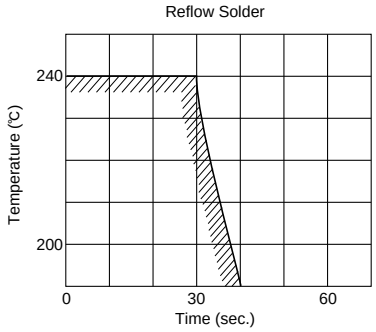
■APPLICATIONS

1. Soldering Conditions

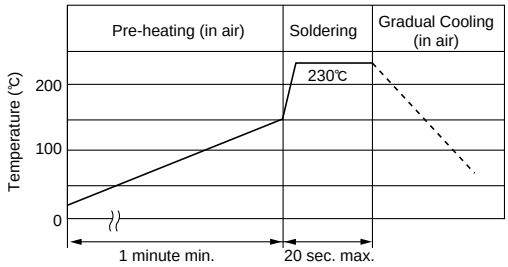
●Soldering Temperature and Time

Solder within the temperature and time combinations illustrated by the slanted lines in the following graph.
If soldering is repeated, please note that the allowed time is the accumulated time.

Solder: 6×4 Solder



●Standard Soldering Conditions



●Soldering Method

Soldering conditions : Soldering iron temperature 270℃
Soldering time less than 3 seconds

2. Cleaning Conditions

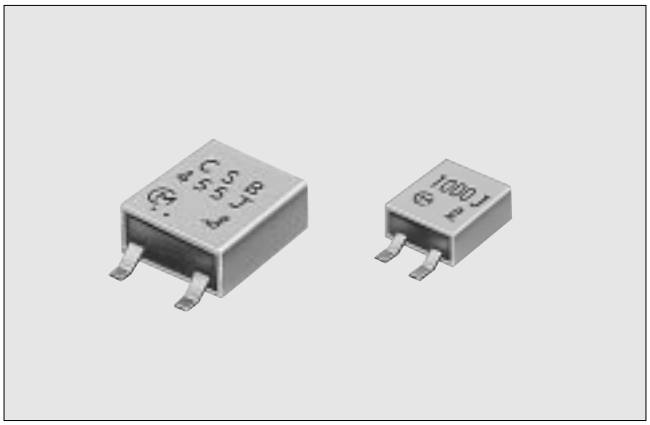
Please contact us concerning cleaning method before use. For protection of ozone layer, we also investigate the non-ODC cleaning process for our devices. For more details, please contact us before use.

CERAMIC RESONATOR

kHz Band SMD Ceramic Resonator **CSBF** Series

Can be reflow soldered and mounted by automatic placers.

MURATA's original package technologies have enabled the development of the kHz band CERALOCK®.
The series is perfect in miniature remote control units and A. V. modules.



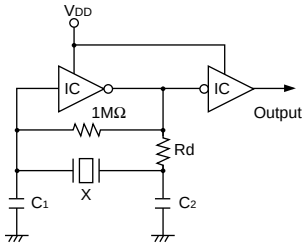
■FEATURES

1. The series withstands reflow soldering.
2. The series is mountable by automatic placers.
3. Its high performance provides stable oscillation.

■APPLICATIONS

1. Clock oscillators for microprocessors.
2. OA equipment
3. AV modules

■SPECIFICATIONS

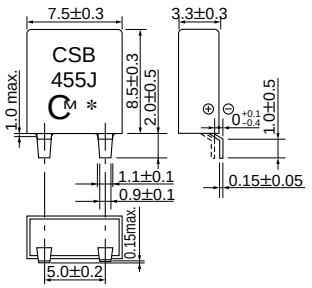
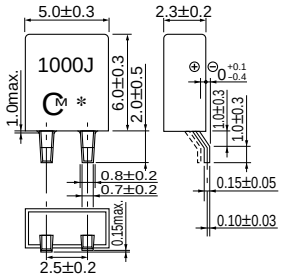
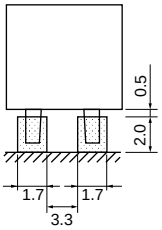
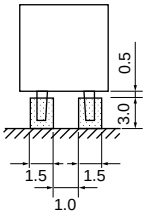
Type / Item	CSBF Series	
	CSBF□J	CSBF□J
Frequency Range	430−519kHz	700−1250kHz
Oscillation Frequency Initial Tolerance	±0.5%	±0.5%
Oscillation Frequency Temperature Stability*1	±0.3%	±0.3%
Aging*2	±0.3%	±0.3%
Oscillation Frequency Measuring Circuit	 IC :1/6CD4069UBE×2 VDD :5V X :CERALOCK® C1,C2 :100pF Rd :5.6kΩ*3	

*1 At -20 to +80℃
*2 For 10 years at room temperature.
*3 This resistance value applies to the 700-1250 kHz range.

CERAMIC RESONATOR

kHz Band SMD Ceramic Resonator **CSBF** Series

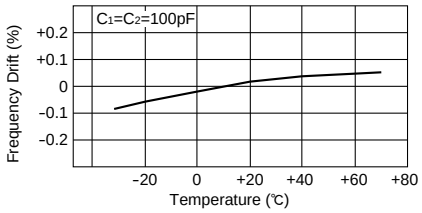
■DIMENSIONS/STANDARD LAND PATTERN (in mm)

Frequency	430−519kHz	700−1250kHz
Type	CSBF□J	CSBF□J*1
Dimensions		
Standard Land Pattern		

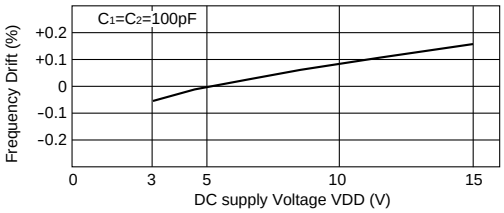
*1 Available in several standard frequencies.

■TECHNICAL DATA

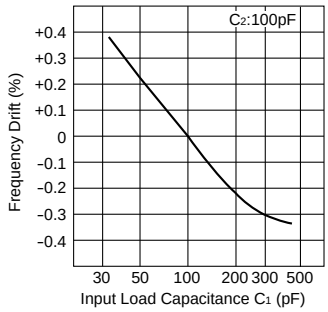
Temperature characteristics
CSBF455J



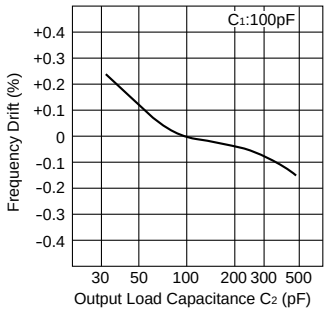
Supply voltage characteristics
CSBF455J



Input load capacitance (C_1) characteristics
CSBF455J



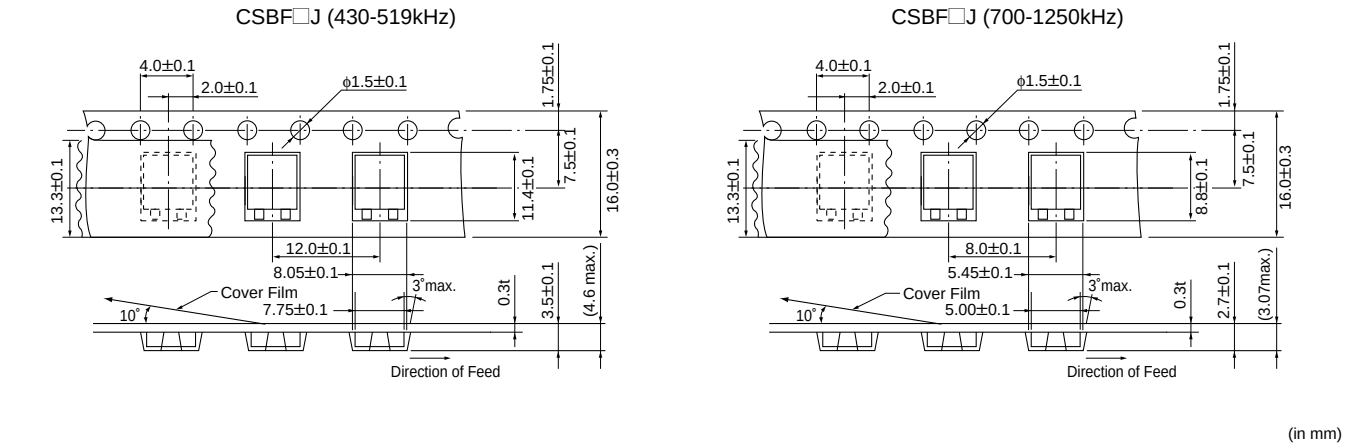
Output load capacitance (C_2) characteristics
CSBF455J



CERAMIC RESONATOR

kHz Band SMD Ceramic Resonator **CSBF** Series

■DIMENSIONS OF PLASTIC TAPE

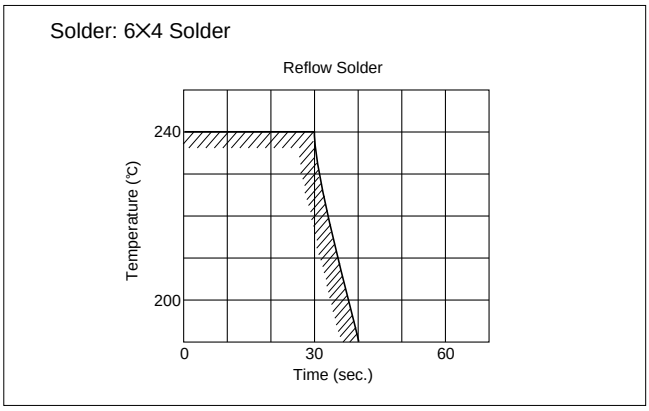


■APPLICATIONS

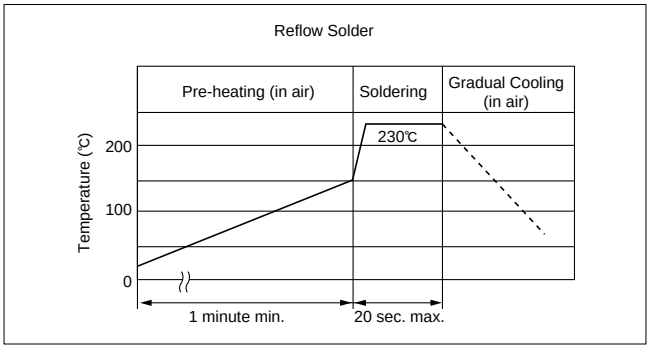
1. Soldering Conditions

●Soldering Temperature and Time

Solder within the temperature and time combinations illustrated by the slanted lines in the following graph.
If soldering is repeated, please note that the allowed time is the accumulated time.



●Standard Soldering Conditions



●Soldering Method

Soldering conditions : Soldering iron temperature 270℃
Soldering time less than 3 seconds

2. Cleaning Conditions

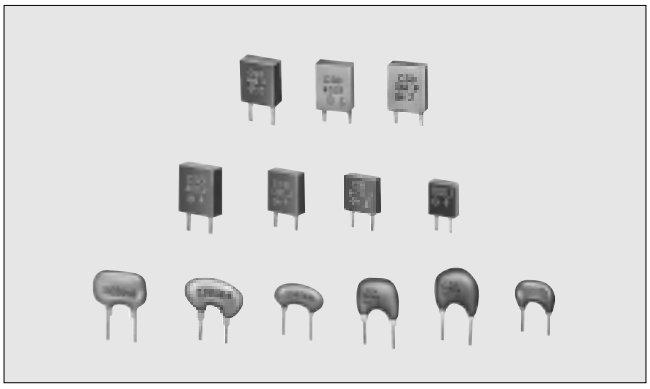
Please contact us concerning cleaning method before use. For protection of ozone layer, we also investigate the non-ODC cleaning process for our devices. For more details, please contact us before use.

CERAMIC RESONATOR

Ceramic Resonator **CSA/CSB** Series

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 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.

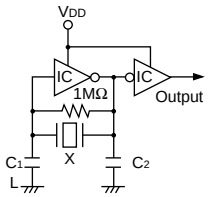
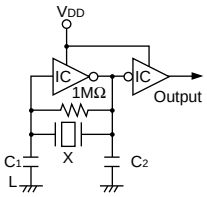
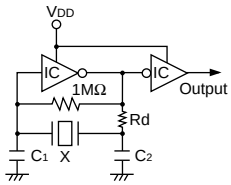
■APPLICATIONS

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.)

CERAMIC RESONATOR

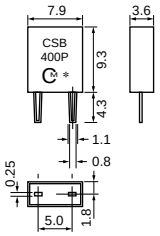
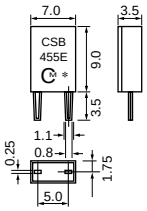
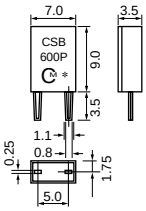
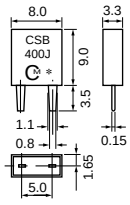
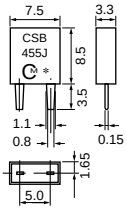
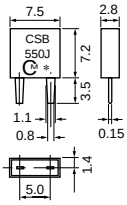
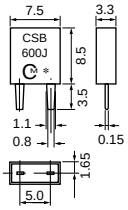
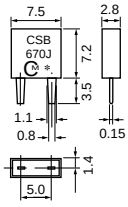
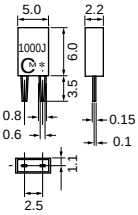
Ceramic Resonator **CSA/CSB** Series

■SPECIFICATIONS

Type / Item	CSA Series				CSB Series	
	CSA□MK	CSA□MG	CSA□MTZ	CSA□MXZ040	No Washable	Washable*6
Frequency Range	1.26–1.79MHz	1.80–6.30MHz	6.31–13.00MHz	13.01–60.00MHz	375–699kHz	375–1250kHz
Oscillation Frequency Initial Tolerance	±0.5%				±2kHz	±0.5kHz
Oscillation Frequency Temperature Stability*1	±0.3%		±0.5%	±0.3%	±0.3%	
Aging*2	±0.3%		±0.5%	±0.3%	±0.5%	
Oscillation Frequency Measuring Circuit	 IC :1/6CD4069UBE×2 VDD :5V (MTZ series:12V) X :CERALOCK® C1,C2 :30pF			 IC :1/6TC74HCU04×2 VDD :5V X :CERALOCK® C1,C2 :30pF*5	 IC :1/6CD4069UBE×2 VDD :5V X :CERALOCK® C1,C2 :Load Capacitors*3 Rd :5.6kΩ*4	

*1 At -20 to +80℃
*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 For the MXZ040 series, the value changes according to frequency.
*6 Washing the resonator is allowed. However, temperature, time and other washing conditions should be evaluated to confirm that stable electrical characteristics are maintained.

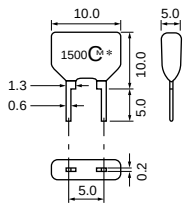
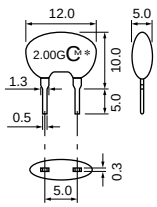
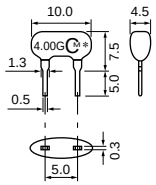
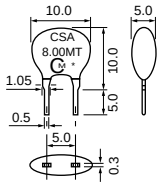
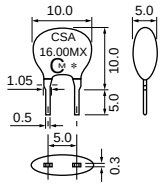
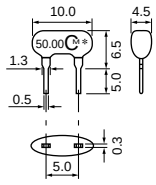
■DIMENSIONS

Standard Products	Not Washable	Frequency	375–429kHz	430–509kHz	510–699kHz			–
		Part Number	CSB□P	CSB□E	CSB□P			–
		Dimensions (in mm)						
	Washable	Frequency	375–429kHz	430–519kHz	520–589kHz	590–655kHz	656–699kHz	700–1250kHz
		Part Number	CSB□J*	CSB□J*	CSB□J*	CSB□JR*	CSB□J*	CSB□J*
		Ultrasonic Cleaning*	ALLOWED	ALLOWED	ALLOWED	ALLOWED	ALLOWED	ALLOWED
		Dimensions (in mm)						

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

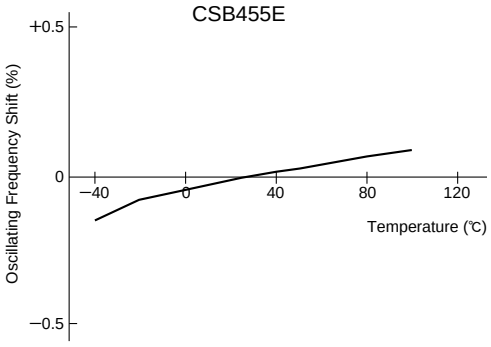
CERAMIC RESONATOR

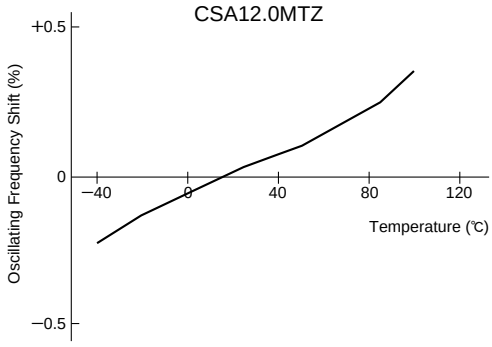
Ceramic Resonator **CSA/CSB** Series

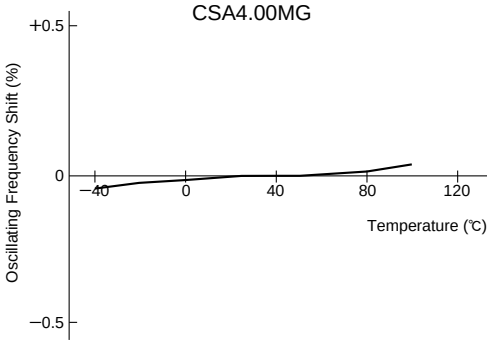
Frequency	1.26–1.79MHz	1.80–2.44MHz	2.45–6.30MHz	6.31–13.00MHz	13.01–32.99MHz	33.00–60.00MHz
Part Number	CSA□MK*	CSA□MG	CSA□MG	CSA□MTZ	CSA□MXZ	CSA□MXZ
Oscillation Mode*	Shear Vibration	Thickness Shear Vibration	Thickness Shear Vibration	Thickness Longitudinal Vibration	Thickness Longitudinal Vibration (3rd OVERTONE)	Thickness Longitudinal Vibration (3rd OVERTONE)
Dimensions (in mm)						

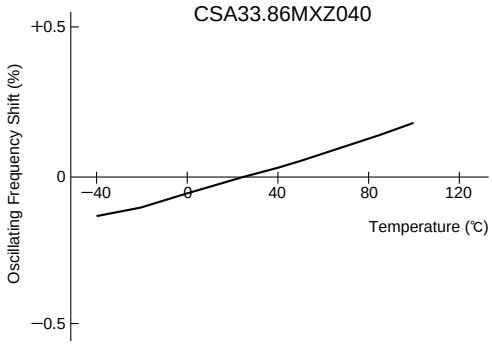
* The CSA□MK type is not washable.

■THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION







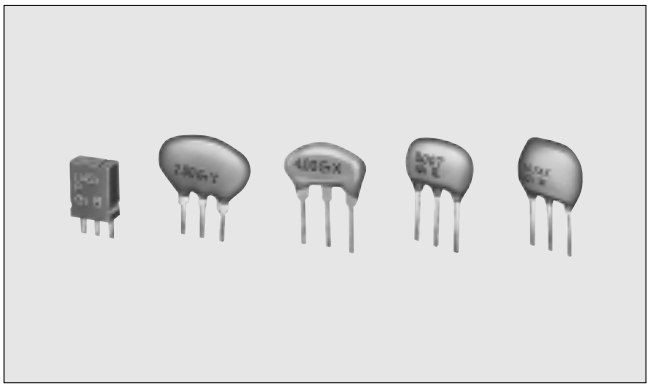


CERAMIC RESONATOR

Ceramic Resonator **CSU/CST** Series

CERALOCK® with built in loading capacitors.

MURATA's ceramic resonator, CERALOCK®,has been widely applied as the most suitable component for clock oscillators in a broad range of microprocessors. The CSU series (kHz band) and CST series (MHz band) can be used in the design of oscillation circuits not requiring external load capacitors, enabling both high-density mounting and cost reduction.



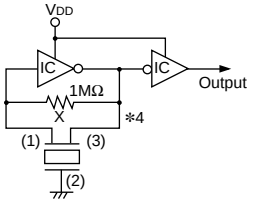
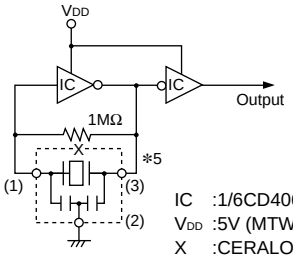
■FEATURES

1. Oscillation circuits do not require external load capacitors.
2. The series is stable over a wide temperature range.
3. The resonators are compact, light weight and exhibit superior shock resistance performance.
4. They enable the design of oscillator circuits requiring no adjustment.
5. The series is inexpensive and available in stable supply.
6. There are some variation of built-in capacitance value to apply various of IC.

■APPLICATIONS

1. DTMF generators •Remote control units
2. Clock oscillators for microcomputers
3. Automated office equipment
   •Automotive electronics (Suffixed "–A" ex. CST□MGWA)

■SPECIFICATIONS

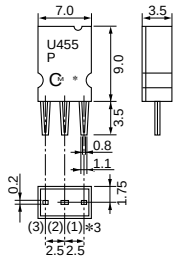
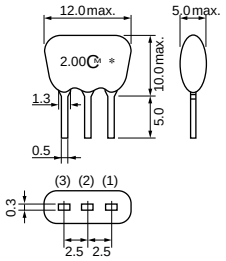
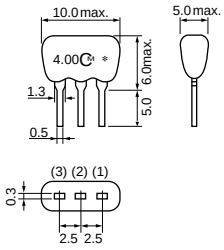
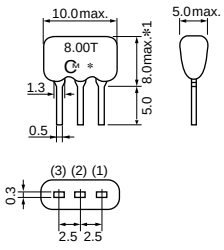
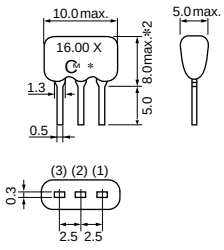
Type / Item	CSU Series	CST Series			
		CST□MG	CST□MGW	CST□MTW	CST□MXW040
Frequency Range	450–500kHz	1.80–2.44MHz	2.45–6.30MHz	6.31–13.00MHz	13.01–60.00MHz
Oscillation Frequency Initial Tolerance	±2kHz	±0.5%	±0.5%	±0.5%	±0.5%
Oscillation Frequency Temperature Stability*1	±0.3%	±0.3%	±0.3%	±0.4%	±0.3%
Aging*2	±0.5%	±0.3%	±0.3%	±0.3%	±0.3%
Oscillation Frequency Test Circuit	 IC :1/6CD4069UBE×2 V_{DD} :5V X :CERALOCK®	 IC :1/6CD4069UBE×2*3 V_{DD} :5V (MTW series:12V) X :CERALOCK®			

*1 At -20 to +80℃ (Temperature Condition)
*2 For 10years at room temperature .
*3 TC74HCU04 is used as the standard circuit for the MXW040 series.
*4 Input terminal (1) should be connected to the input of an inverter.
*5 If connected with incorrect orientation, the above specification may not be guaranteed.

CERAMIC RESONATOR

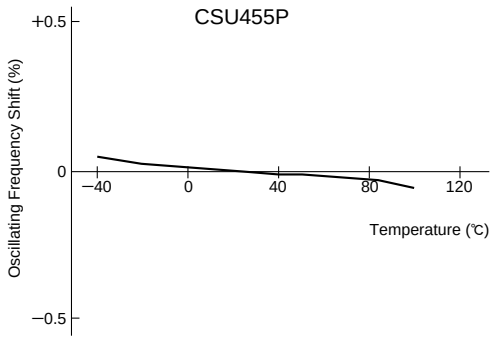
Ceramic Resonator **CSU/CST** Series

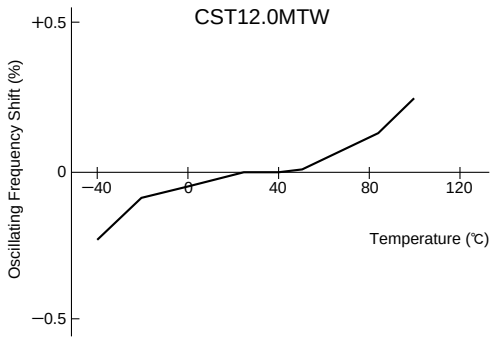
■DIMENSIONS

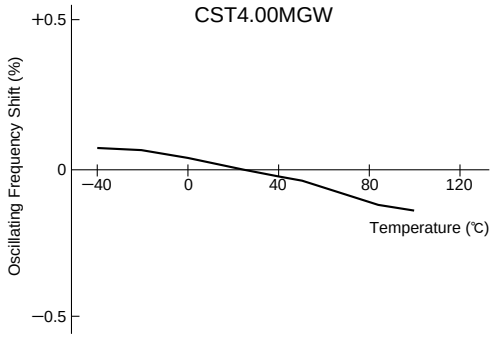
Frequency	450−500kHz	1.80−2.44MHz	2.45−6.30MHz	6.31−13.00MHz	13.01−60.00MHz
Part Number	CSU□P*4	CST□MG	CST□MGW	CST□MTW	CST□MXW
Dimensions (in mm)					

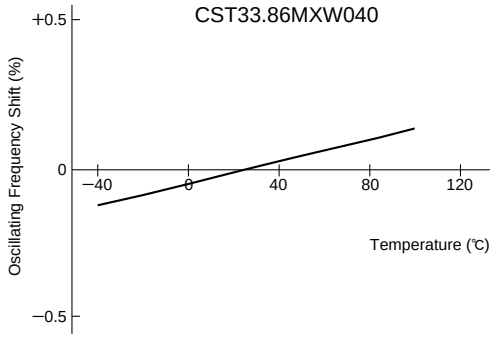
*1 6.31−7.99MHz: 9.0mm max.
*2 13.01−14.99MHz: 9.0mm max., 33.00−60.00MHz:7.0mm max.
*3 Terminals have directionality : (1) Input (2) Ground (3) Output
*4 The CSU□P is not washable.

■THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION



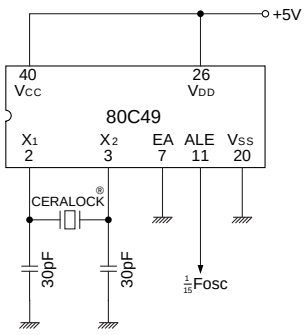






■APPLICATION CIRCUITS UTILIZING THE CERALOCK®

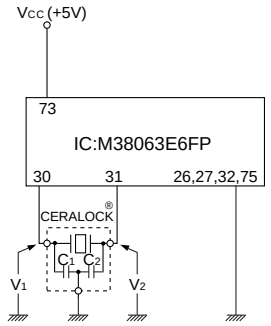
Application to 80C49 (8-bit Microcomputer)



CSA4.00MG
(4MHz)
CSA6.00MG
(6MHz)
CSA11.0MTZ
(11MHz)
Can be applied

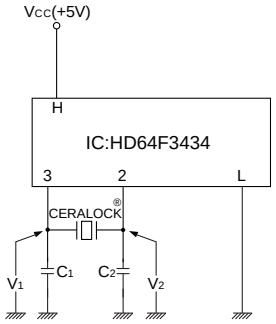
(1)80C49 (INTEL)
(2)µPD80C49 (NEC)
(3)TMP80C49 (TOSHIBA)
(4)MSM80C49 (OKI)
(5)M5L80C49 (MITSUBISHI)

Application to M38063E6FP (MITSUBISHI) (8-bit Microcomputer)



Recommendable Value
CERALOCK® : CST4.00MGW
C_1=30pF±20%
C_2=30pF±20%

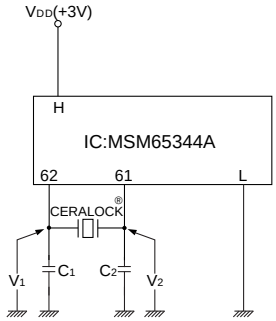
Application to HD64F3434 (HITACHI) (8-bit Microcomputer)



H:1, 4, 8, 9, 37, 59
L:5, 6, 7, 15, 46, 70, 71, 100

Recommendable Value
CERALOCK® : CSA16.00MXZ040
C_1=22pF
C_2=22pF

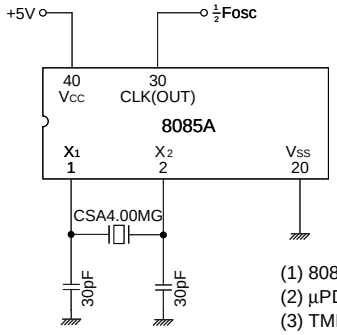
Application to MSM65344A (8-bit Microcomputer)



H:25, 52, 73–75
L:18, 63

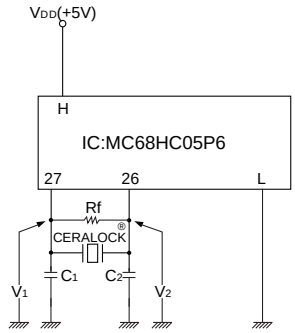
Recommendable Value
CERALOCK® : CSA5.00MG
C_1=30pF
C_2=30pF

Application to 8085 (8-bit Microcomputer)



(1) 8085A (INTEL)
(2) µPD8085A (NEC)
(3) TMP8085A (TOSHIBA)
(4) MSM8085A (MITSUBISHI)

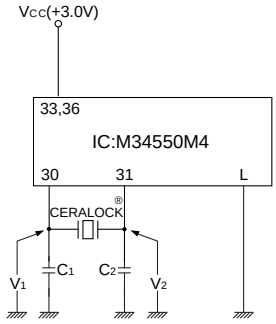
Application to MC68HC05P6 (MOTOROLA) (8-bit Microcomputer)



H:2,15-18,23,25,28
L:11-14

Recommendable Value
CERALOCK® : CSA4.00MG
C_1=30pF
C_2=30pF
Rf=1MΩ

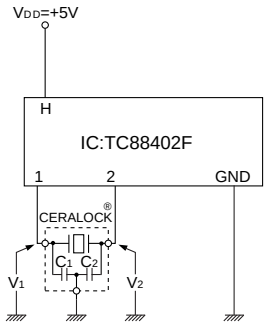
Application to M34550M4 (MITSUBISHI) (Remote Control Unit)



L:13–27, 29, 32, 37–40

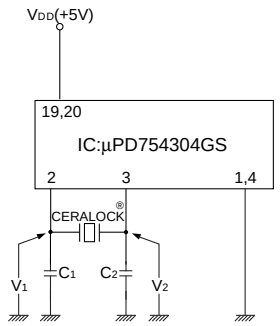
Recommendable Value
CERALOCK® : CSB455E
C_1=220pF
C_2=220pF

Application to TC88402F (TOSHIBA) (Speech Synthesizer)



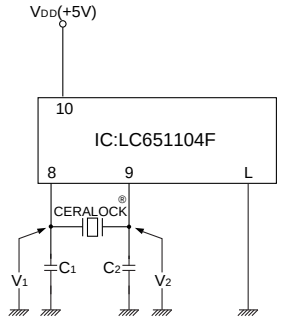
Recommendable Value
CERALOCK® : CST24.57MXW0WH1
C_1=5pF±20%
C_2=5pF±20%

Application to μPD754304GS (4-bit Microcomputer)



Recommendable Value
CERALOK® : CSA4.00MG
C_1=30pF
C_2=30pF

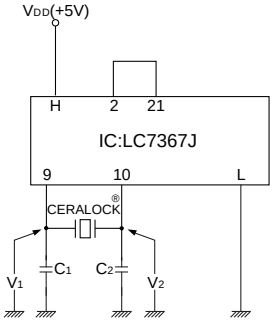
Application to 651104F (SANYO) (4-bit Microcomputer)



L:1—7, 11, 16—20, 25, 26, 29

Recommendable Value
CERALOCK® : CCSA4.00MG
C_1=33pF
C_2=33pF

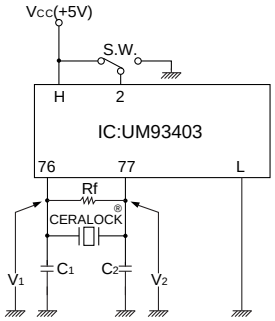
Application to LC7367J (SANYO) (Tone / Pulse Dialer)



H:11
L:5, 6, 7, 8, 12

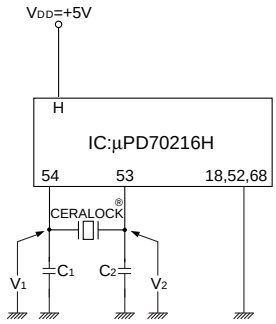
Recommendable Value
CERALOCK® : CSA3.58MG300GA
C_1=30pF
C_2=30pF

Application to UM93403 (UMC) (Tone / Pulse Dialer)



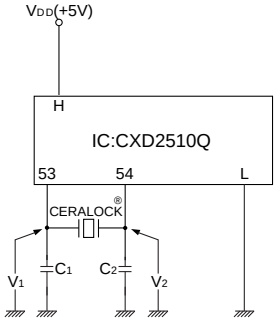
Recommendable Value
CERALOCK® : CSA3.58MG300FGA
C_1=30pF
C_2=30pF
Rf=1MΩ

Application to μPD70216H (NEC) (16-bit Microcomputer)



Recommendable Value
CERALOCK® : CSACS32.00MX040
C_1=5pF
C_2=5pF

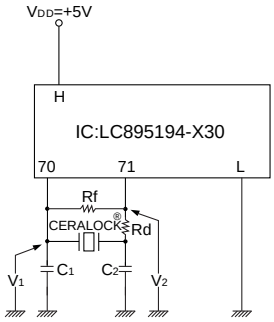
Application to CXD2510Q (SONY) (Digital Signal Processing IC for CD)



H:33, 37
L:12, 52

Recommendable Value
CERALOCK® : CSA33.86MXZ040
C_1=5pF
C_2=5pF

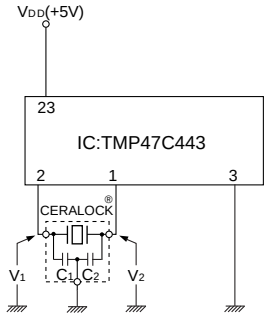
Application to LC895194-X30 (SANYO)



H:18, 37, 73, 90
L:1, 4, 7, 19, 36, 55, 69,
72, 75, 82, 91, 108

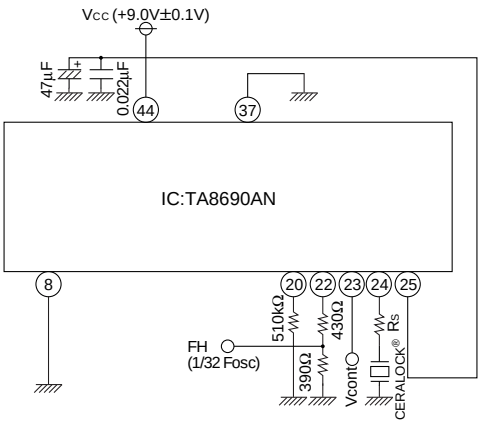
Recommendable Value
CERALOCK® : CSA33.86MXZ040
C_1= 0pF
C_2=47pF
Rd=15Ω
Rf=1MΩ

Application to TMP47C443 (TOSHIBA) (4-bit Microcomputer)



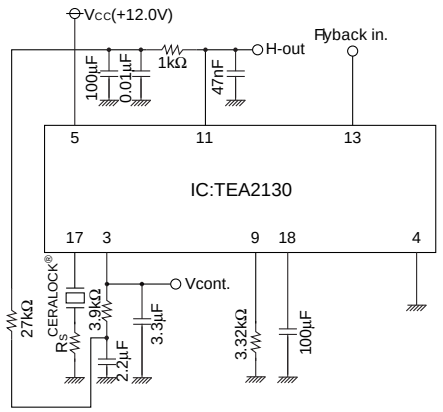
Recommendable Value
CERALOCK® : CST4.00MGW
C_1=30pF±20%
C_2=30pF±20%

Application to TA8690AN (TOSHIBA)
(TV Horizontal / Vertical Synthesizer Circuit)



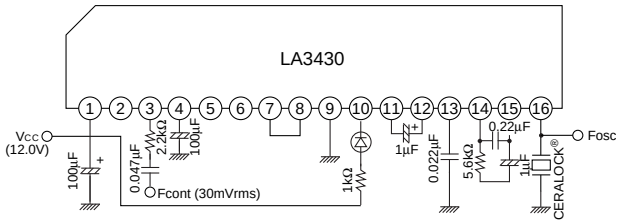
Recommendable Value
CERALOCK® : CSB503F46
RS=150Ω

Application to TEA2130 (THOMSON)
(TV Horizontal / Compatible with synthesizer Circuit)



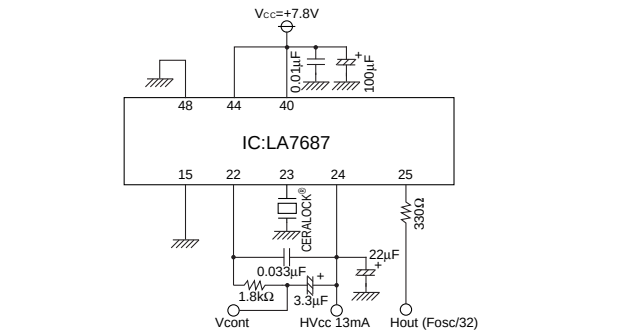
Recommendable Value
CERALOCK® : CSB503F12
RS=470Ω

Application to LA3430 (SANYO) (FM Stereo MPX)



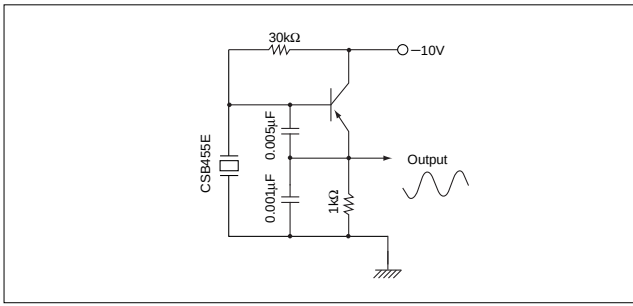
Recommendable Value
CERALOCK® : CSB456F15

Application to LA7687 (SANYO)
(TV Horizontal Synthesizer Circuit)

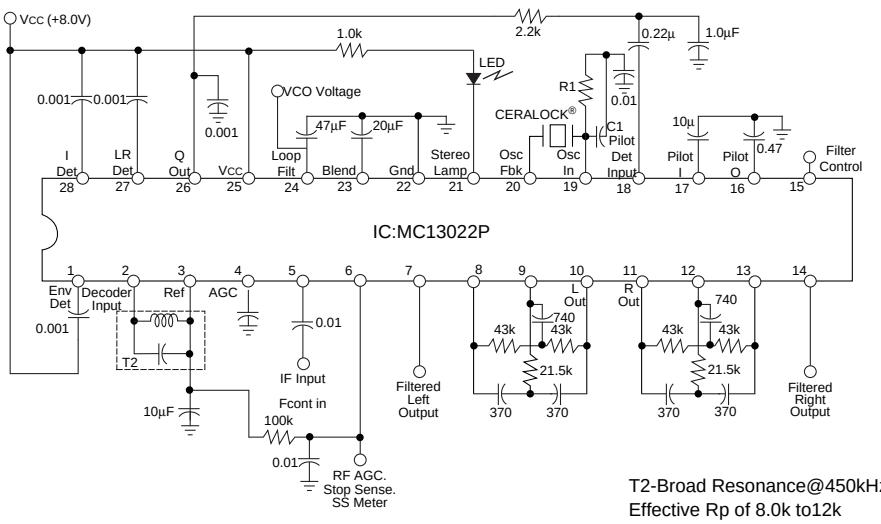


Recommendable Value
CERALOCK® : CSB500F55

Oscillation Circuit incorporating Transistor



Application to MC13022P (MOTOROLA) (AM Stereo Decoder)



T2-Broad Resonance@450kHz
Effective Rp of 8.0k to12k
(Part No.to be Determined)

Recommendable Value
CERALOCK® : CSA3.60MGF103
C_1=56pF
R_1=2.2kΩ

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   ③ Undersea equipment
   ④ Medical equipment
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   ⑥ Traffic signal equipment
   ⑦ Disaster prevention / crime prevention equipment
   ⑧ Data-processing equipment
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