CERAMIC RESONATOR (CERALOCK®)

CERAMIC RESONATOR (CERALOCK®)

muRata

Innovator in Electronics

Murata Manufacturing Co., Ltd.

Cat.No.P16E-11

■CONTENTS

■NOTICE

- The component may be damaged if excess mechanical stress is applied.
- Please do not apply excess mechanical stress to the component and lead terminals at soldering.
- Conformal coating of the component is acceptable. However, the resin material, curing temperature, and other process conditions should be evaluated to confirm stable electrical characteristics are maintained.
- 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.
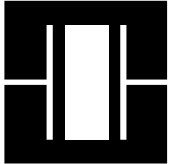
CERAMIC RESONATOR

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

muRata

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

- Clock oscillators for microprocessors.
- Electronic control circuits for small electronic equipment such as hand held movie.
- Audio-visual applications (Camcorder, Remote Controller, etc.)
- Office automation equipments (DVD, CD-ROM, HDD, FDD, etc.)
- Automotive electronics (CSTCC□MGA series, CSTCV□MXA series)
- Dual Tone Multi Frequency (DTMF) generator for cordless telephones.

■SPECIFICATIONS

Type Item	CSTCC Series	CSTCV Series		CSTCW Series	
	CSTCC□MG	CSTCV□MTJ	CSTCV□MXJ040	CSTCW□MX03	CSTCW□MX01
Frequency Range	2.00−10.00MHz*1	10.01−13.49MHz	13.50−20.00MHz	20.01−24.99MHz	25.00−70.00MHz
Oscillation Frequency Initial Tolerance	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
Oscillation Frequency Temperature Stability*2	±0.3%	±0.4%	±0.3%	±0.2%	±0.2%
Aging*3	±0.3%	±0.3%	±0.3%	±0.1%	±0.1%
Oscillation Frequency Measuring Circuit					

V_{DD}

IC

IC

Output

1MΩ

X

*5

(1)   (3)

(2)

IC :1/6CD4069UBEX2*4
V_{DD} :5V (MTJ series:12V)
X   :Chip CERALOCK®

*1 Available in several standard frequencies. (ex. 2.00, 2.45, 3.00, 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, MX03 and MX01 series (Except MX series 60.01-70.00MHz).
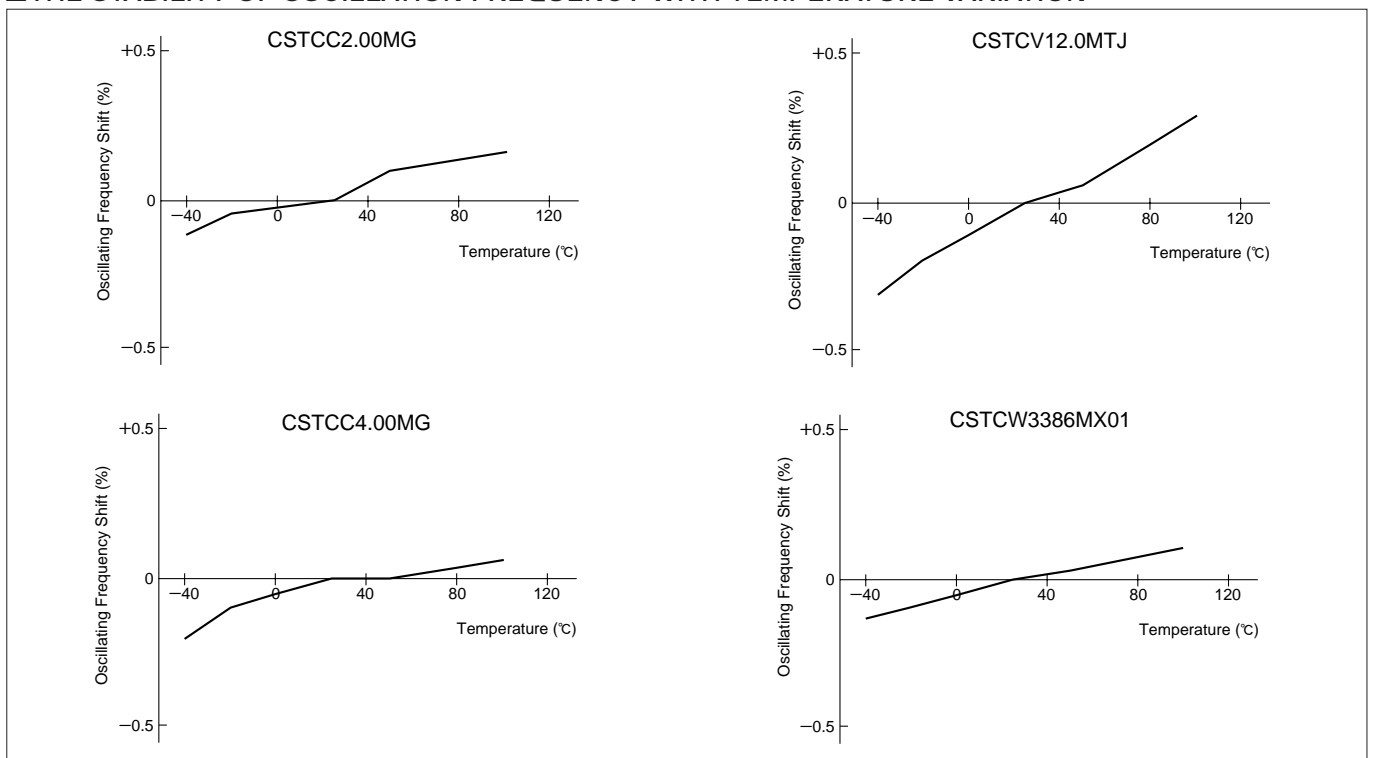   SN74AHCU04 is used as the standard circuit for MX series (60.01-70.00MHz).
*5 If connected with incorrect orientation, the above specification may not be guaranteed.
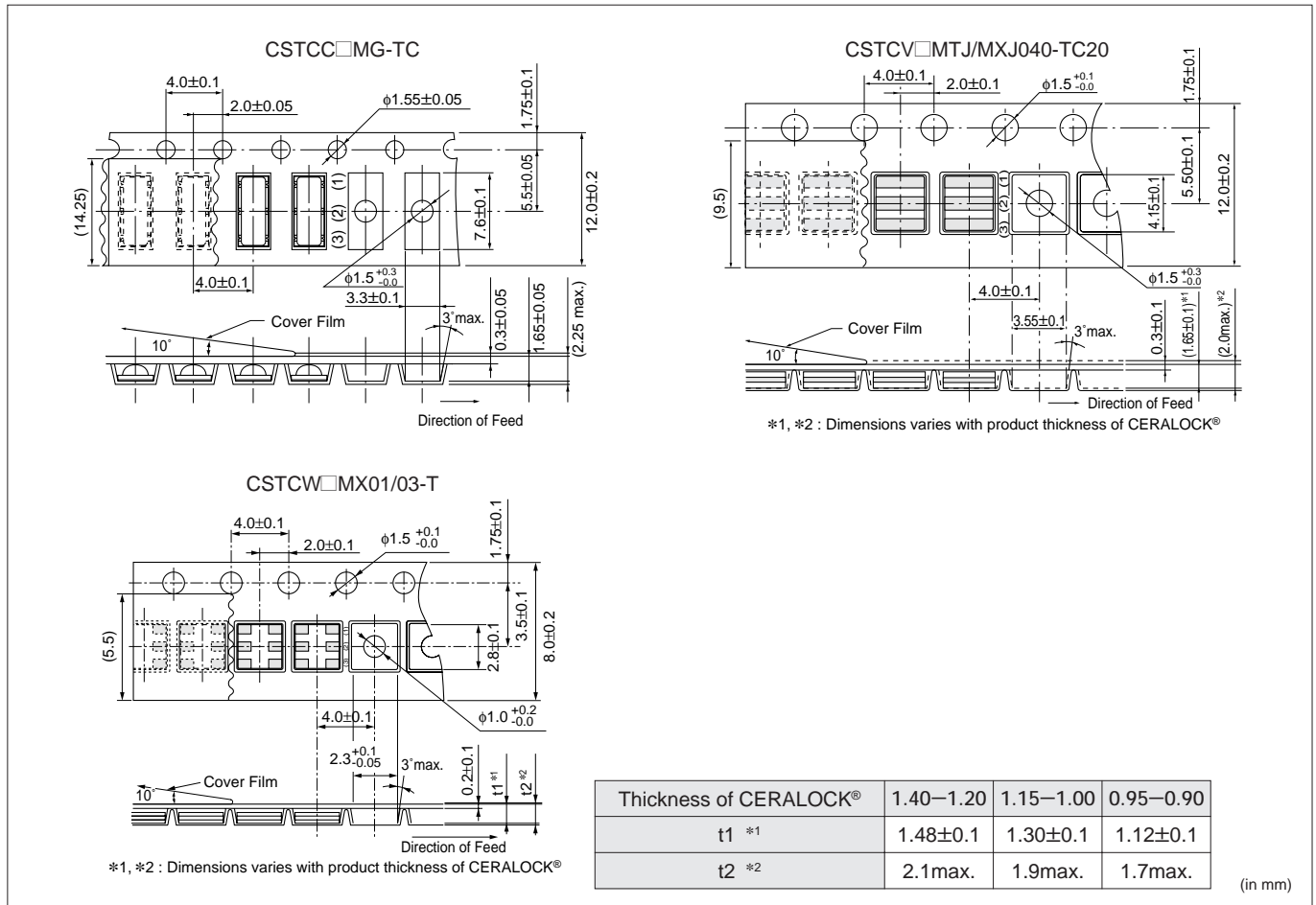
■DIMENSIONS/STANDARD LAND PATTERN (in mm tol.:±0.3mm)

Frequency	2.00—10.00MHz	10.01—13.49MHz	13.50—20.00MHz	20.01—70.00MHz
Type	CSTCC□MG	CSTCV□MTJ	CSTCV□MXJ040	CSTCW□MX01/03
Dimensions		*2 Thickness varies with frequencies. ● Land pattern and dimension of electrode that automotive use of CSTCV□MX is different from below Figure.		*3 Thickness varies with frequencies.
Standard Land Pattern				

*1 1.75±0.05 under 2.99MHz

■THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION

CSTCC2.00MG

CSTCV12.0MTJ

CSTCC4.00MG

CSTCW3386MX01

■DIMENSIONS OF PLASTIC TAPE

CSTCC□MG-TC

4.0±0.1
2.0±0.05
φ1.55±0.05
1.75±0.1
5.5±0.05
7.6±0.1
(14.25)
12.0±0.2
4.0±0.1
φ1.5 +0.3 -0.0
3.3±0.1
0.3±0.05
1.65±0.05
(2.25 max.)

Cover Film
10°
3°max.
Direction of Feed

CSTCV□MTJ/MXJ040-TC20

4.0±0.1
2.0±0.1
φ1.5 +0.1 -0.0
1.75±0.1
5.50±0.1
4.15±0.1
(9.5)
12.0±0.2
4.0±0.1
3.55±0.1
φ1.5 +0.3 -0.0
0.3±0.1
(1.65±0.1)*1
(2.0max.)*2

Cover Film
10°
3°max.
Direction of Feed

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

CSTCW□MX01/03-T

4.0±0.1
2.0±0.1
φ1.5 +0.1 -0.0
1.75±0.1
2.8±0.1
3.5±0.1
8.0±0.2
(5.5)
4.0±0.1
2.3 +0.1 -0.05
φ1.0 +0.2 -0.0
0.2±0.1
t1 *1
t2 *2
3°max.

Cover Film
10°
Direction of Feed

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

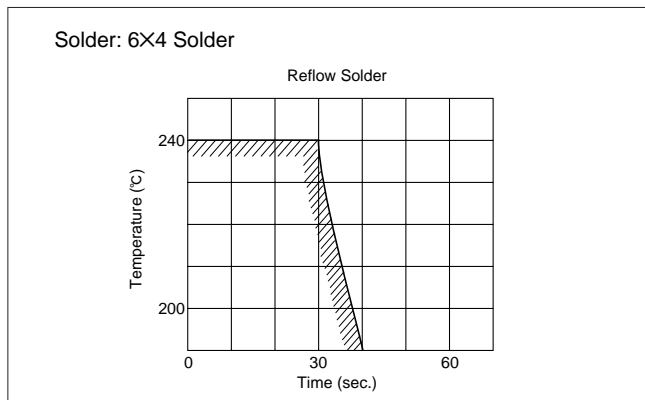| Thickness of CERALOCK®	1.40−1.20	1.15−1.00	0.95−0.90
t1 ∗1	1.48±0.1	1.30±0.1	1.12±0.1
t2 ∗2	2.1max.	1.9max.	1.7max.

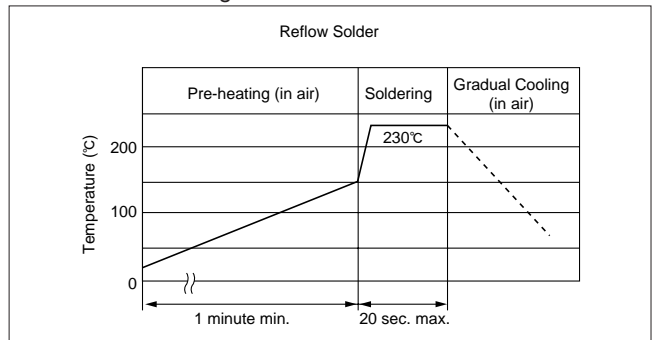(in mm)

■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

Reflow Solder
240
200
Temperature (℃)
0   30   60
Time (sec.)

● Standard Soldering Conditions

Reflow Solder

| Pre-heating (in air) | Soldering | Gradual Cooling (in air) |

230℃
Temperature (℃)
200
100
0
1 minute min.
20 sec. max.

● 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 **CSACV/CSACW** Series

muRata

# 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 necessary for oscillation circuits.

■APPLICATIONS
- Clock oscillators for microprocessors.
- Electronic control circuits for small electronic equipment.
- Automotive electronics (CSACV□MXA series)
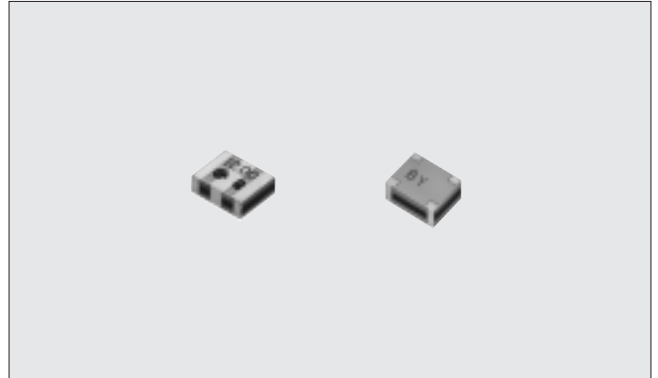
■SPECIFICATIONS

Type Item	CSACV Series		CSACW Series	
	CSACV□MTJ	CSACV□MXJ040	CSACW□MX03	CSACW□MX01
Frequency Range	10.01—13.49MHz	13.50—20.00MHz	20.01—24.99MHz	25.00—70.00MHz
Oscillation Frequency Initial Tolerance	±0.5%	±0.5%	±0.5%	±0.5%
Oscillation Frequency Temperature Stability[1]	±0.5%	±0.3%	±0.2%	±0.2%
Aging[2]	±0.5%	±0.3%	±0.1%	±0.1%
Oscillation Frequency Measuring Circuit				

V_{DD}

IC

1MΩ

IC

Output

X

C_1

C_2

IC   :1/6CD4069UBE×2[3]
V_{DD} :5V (MTJ series:12V)
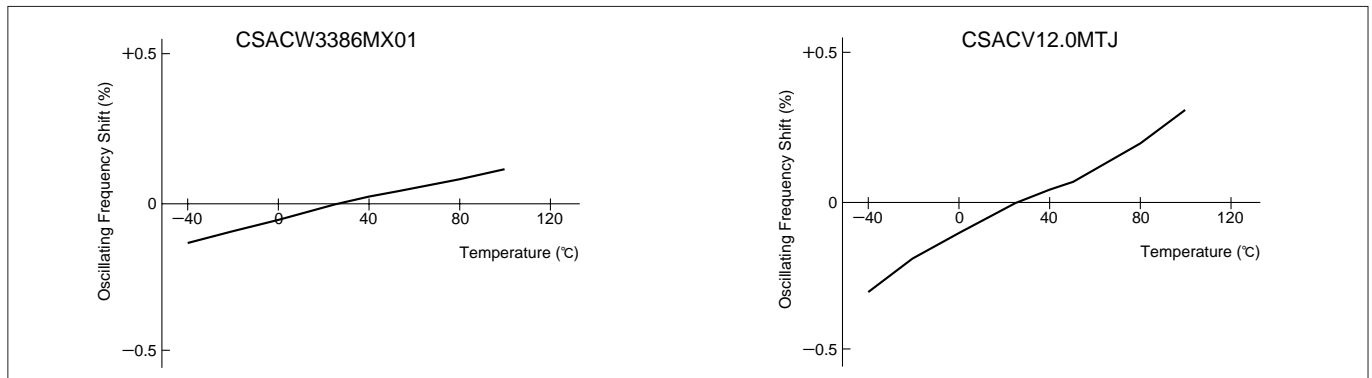X   :Chip CERALOCK®

[1] At -20 to +80℃
[2] For 10 years at room temperature
[3] TC74HCU04 is used as the standard circuit for the MXJ040, MX03 and MX01 series (Except MX series 60.01-70.00MHz).
     SN74AHCU04 is used as the standard circuit for MX series (60.01-70.00MHz).
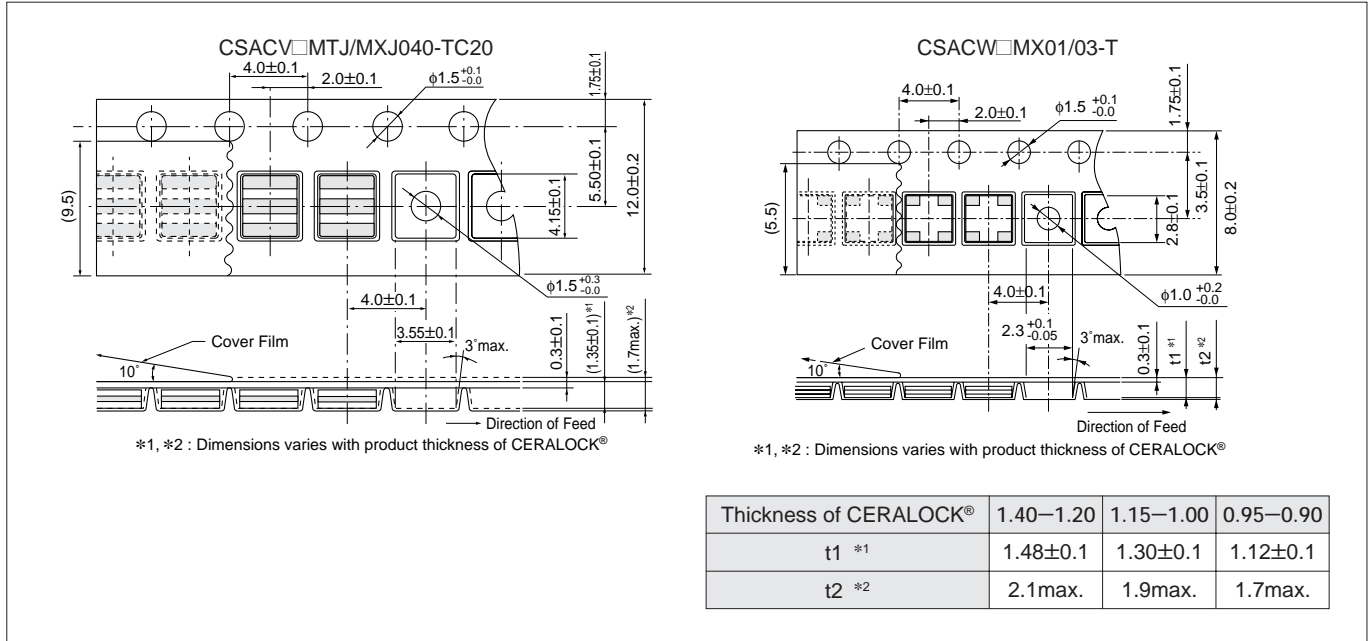
■DIMENSIONS/STANDARD LAND PATTERN (in mm)

Frequency	10.01—13.49MHz	13.50—20.00MHz	20.01—70.00MHz
Type	CSACV□MTJ	CSACV□MXJ040	CSACW□MX01/03

Dimensions

3.7±0.2　3.1±0.2　1.1±0.1*1　(0.7)(3) (0.9)(2) (0.7)(1)　0.6±0.3 0.7±0.3 0.6±0.3

0.7±0.3 0.9±0.3 0.7±0.3　1.5±0.2 1.5±0.2　1.85±0.3

2.5±0.2　2.0±0.2　1.0*2　(0.5)(0.5)　0.05+0.10-0.05　0.4+0.3-0.2　0.5±0.2　1.0±0.2 1.0±0.2　1.25±0.2

*1 Thickness varies with frequency.
● 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.
● Land pattern and didmension of electrode that automotive use of CSTCV□MX is different from Figure below.

*2 Thickness varies with frequency.

Standard Land Pattern

0.7 0.7 0.9 0.7 0.7　1.0 0.5　3.1±0.2　1.5 1.5

0.8 0.3 0.5　2.0±0.2　2.0　Land

■THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION

CSACW3386MX01 / CSACV12.0MTJ (graphs: Oscillating Frequency Shift (%) vs Temperature (℃))

■DIMENSIONS OF PLASTIC TAPE

CSACV□MTJ/MXJ040-TC20

4.0±0.1
2.0±0.1
φ1.5 $^{+0.1}_{-0.0}$
1.75±0.1
(9.5)
5.50±0.1
12.0±0.2
4.15±0.1
φ1.5 $^{+0.3}_{-0.0}$
(1.35±0.1) *1
(1.7max.) *2
0.3±0.1
4.0±0.1
3.55±0.1
3°max.
Cover Film
10°
Direction of Feed

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

CSACW□MX01/03-T

4.0±0.1
2.0±0.1
φ1.5 $^{+0.1}_{-0.0}$
1.75±0.1
(5.5)
3.5±0.1
8.0±0.2
2.8±0.1
φ1.0 $^{+0.2}_{-0.0}$
4.0±0.1
2.3 $^{+0.1}_{-0.05}$
3°max.
0.3±0.1
t1 *1
t2 *2
Cover Film
10°
Direction of Feed

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

Thickness of CERALOCK®	1.40—1.20	1.15—1.00	0.95—0.90
t1 *1	1.48±0.1	1.30±0.1	1.12±0.1
t2 *2	2.1max.	1.9max.	1.7max.

■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

Reflow Solder

240
200

Temperature (℃)

0   30   60
Time (sec.)

● Standard Soldering Conditions

Reflow Solder

Pre-heating (in air)	Soldering	Gradual Cooling (in air)

230℃

Temperature (℃)
200
100
0

1 minute min.   20 sec. max.

● 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

muRata

kHz Band SMD Ceramic Resonator **CSBF** Series

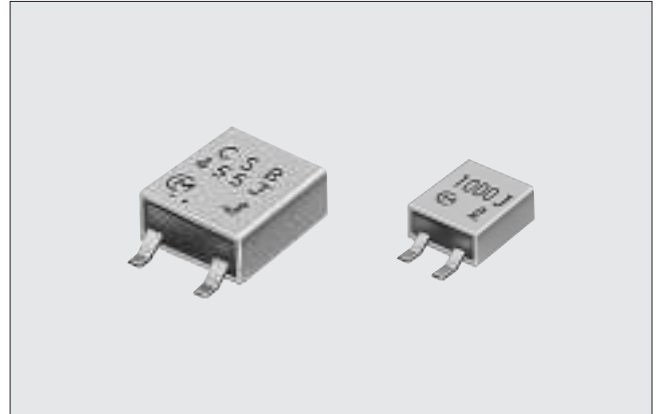# Can be reflow soldered and mounted by automatic placers.

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

■FEATURES
1. The series withstands reflow soldering.
2. The series is mountable by automatic placers.
3. No adjustment is necessary for oscillation circuits.

■APPLICATIONS
● Clock oscillators for microprocessors.
● OA equipment
● 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 V_DD :5V X :CERALOCK® C₁,C₂ :100pF Rd :5.6kΩ*3	

In the circuit:
V_{DD}

IC — 1MΩ — IC — Output

Rd

C₁ X C₂

IC   :1/6CD4069UBE×2
V_{DD} :5V
X   :CERALOCK®
C_1, C_2 :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.

■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

CSBF1000J

■DIMENSIONS OF PLASTIC TAPE

CSBF☐J (430-519kHz)
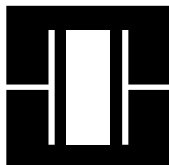
CSBF☐J (700-1250kHz)

Direction of Feed

Direction of Feed

■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

Reflow Solder

● Standard Soldering Conditions

Reflow Solder

Pre-heating (in air)	Soldering	Gradual Cooling (in air)

230℃

1 minute min.   20 sec. max.

● 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
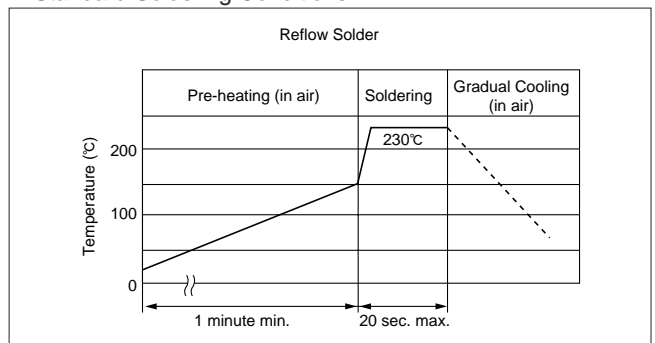
Ceramic Resonator **CSA/CSB** Series

muRata

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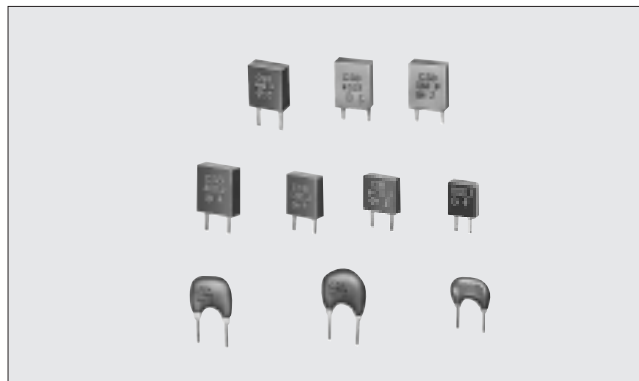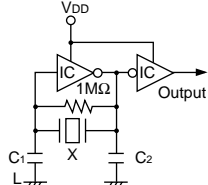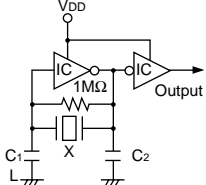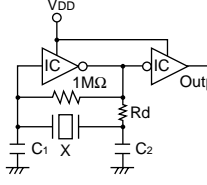
■FEATURES
1. The series is stable over a wide temperature range and with respect to long-term aging.
2. The series comprises fixed, tuned, solid-state devices.
3. The resonators are miniature and light weight.
4. They exhibit excellent shock resistance performance.
5. Oscillating circuits requiring no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

■APPLICATIONS
- Square-wave and sine-wave oscillator.
- Clock generator for microprocessors.
- Tone Dialers and Pulse Dialers for telephone.
- Remote control systems.
- Automotive electronics (engine control, digital speed meters, etc.) (Suffixed "A". ex. CSB☐JA)

■SPECIFICATIONS

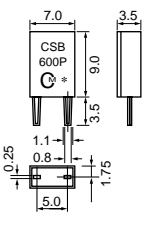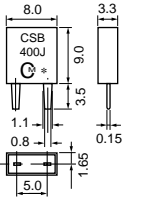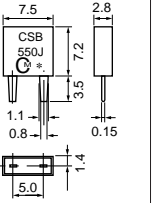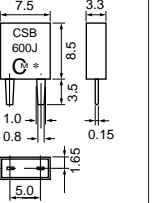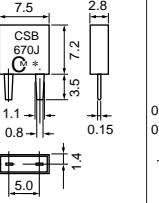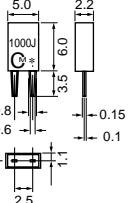| Item \ Type	CSA Series		CSB Series	
	CSA□MTZ	CSA□MXZ040	No Washable	Washable
Frequency Range	10.01—13.00MHz	13.01—60.00MHz	375—699kHz	375—1250kHz
Oscillation Frequency Initial Tolerance	±0.5%		±2kHz	±0.5kHz
Oscillation Frequency Temperature Stability*1	±0.5%	±0.3%	±0.3%	
Aging*2	±0.5%	±0.3%	±0.5%	
Oscillation Frequency Measuring Circuit	IC :1/6CD4069UBE×2 V_{DD} :12V X :CERALOCK® C_1,C_2 :30pF	IC :1/6TC74HCU04×2 V_{DD} :5V X :CERALOCK® C_1,C_2 :30pF*5	IC :1/6CD4069UBE×2 V_{DD} :5V X :CERALOCK® C_1,C_2 :Load Capacitors*3 Rd :5.6kΩ*4	
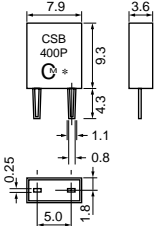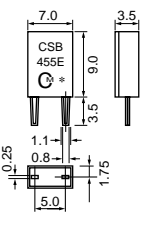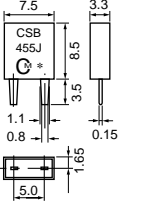
*1 At -20 to +80℃
*2 For 10 years at room temperature.
*3 Values vary according to frequency. Please contact us for details.

*4 700—1250kHz (J Type) only.
*5 For the MXZ040 series, the value changes according to frequency.

■DIMENSIONS

|		Frequency	375—429kHz	430—509kHz	510—699kHz			—
Standard Products	**Not Washable**	Part Number	CSB□P	CSB□E	CSB□P			—
		Dimensions (in mm)	CSB 400P	CSB 455E	CSB 600P			—
		Frequency	375—429kHz	430—519kHz	520—575kHz	576—655kHz	656—699kHz	700—1250kHz
	Washable	Part Number	CSB□J	CSB□J	CSB□J	CSB□JR	CSB□J	CSB□J
		Ultrasonic Cleaning*6	ALLOWED*6	ALLOWED*6	ALLOWED*7	ALLOWED*6	ALLOWED*6	ALLOWED*6
		Dimensions (in mm)	CSB 400J	CSB 455J	CSB 550J	CSB 600J	CSB 670J	1000J

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

■DIMENSIONS

Frequency	10.01─13.00MHz	13.01─32.99MHz	33.00─60.00MHz
Part Number	CSA□MTZ	CSA□MXZ	CSA□MXZ
Oscillation Mode	Thickness Longitudinal Vibration	Thickness Longitudinal Vibration (3rd OVERTONE)	Thickness Longitudinal Vibration (3rd OVERTONE)
Dimensions (in mm)			

■THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION

CSB455E


CSA12.0MTZ

CSA33.86MXZ040
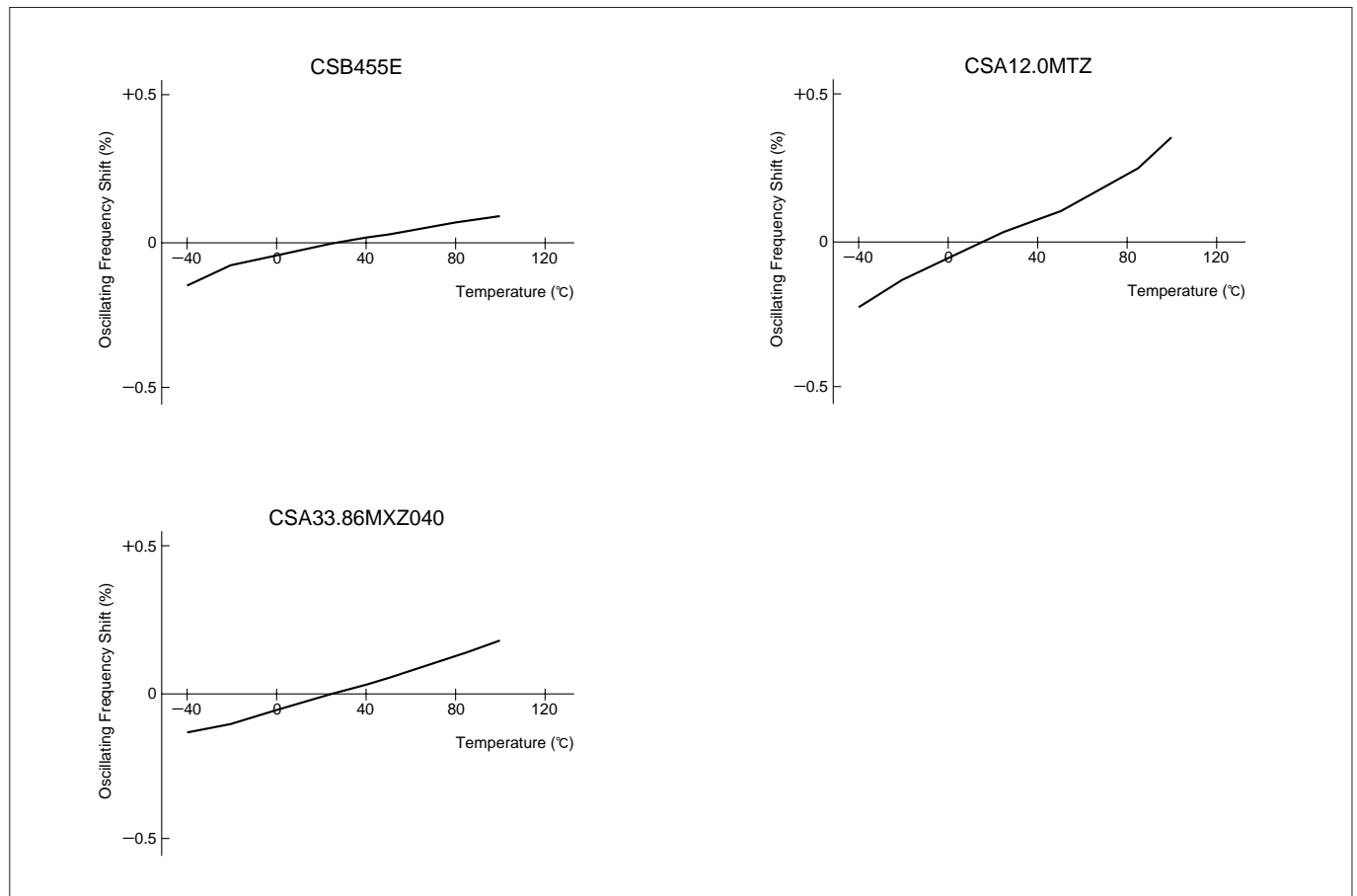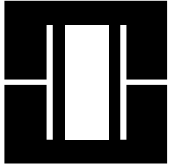
CERAMIC RESONATOR
Ceramic Resonator **CST/CSTS** Series

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 CSTS series (MHz 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.
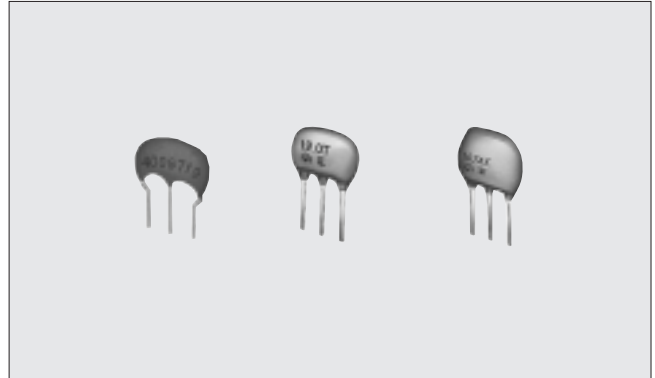
■APPLICATIONS
- DTMF generators
- Remote control units
- Clock oscillators for microcomputers
- Automated office equipment
  Automotive electronics (Suffixed "A" ex. CSTS-MGA)

■SPECIFICATIONS

Type / Item	CSTS Series	CST Series	
	CSTS□MG03/06	CST□MTW	CST□MXW040
Frequency Range	2.00—10.00MHz	10.01—13.00MHz	13.01—60.00MHz
Oscillation Frequency Initial Tolerance	±0.5%	±0.5%	±0.5%
Oscillation Frequency Temperature Stability*1	±0.2%	±0.4%	±0.3%
Aging*2	±0.2%	±0.3%	±0.3%
Oscillation Frequency Test Circuit			

Test Circuit notes:
- IC :1/6CD4069UBEX2*3
- V_DD :5V (MTW series:12V)
- X :CERALOCK®
- Rd :680Ω*4

1MΩ, Rd, Output, V_DD, (1), (2), (3) *5

*1 At -20 to +80℃ (Temperature Condition). This value varies for built-in capacitance of the CSTS series.
*2 For 10years at room temperature .
*3 TC74HCU04 is used as the standard circuit for the MXW040 series. TC4069UBE is used as the standard circuit for the CSTS□MG03 series.
*4 This resistance value applies to the CSTS□MG06 series.
*5 If connected with incorrect orientation, the above specification may not be guaranteed.

■DIMENSIONS

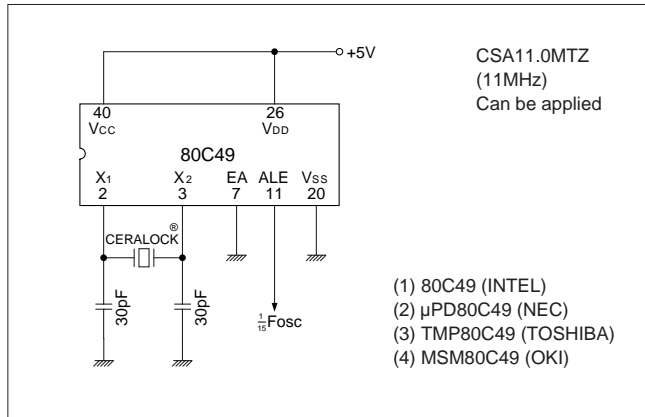| Frequency	2.00—10.00MHz	10.01—13.00MHz	13.01—60.00MHz
Part Number	CSTS□MG	CST□MTW	CST□MXW
Dimensions (in mm)			

＊1　2.00—3.39MHz: 9.0±1.0mm.
＊2　2.00—3.39MHz: 4.0±1.0mm.
＊3　13.01—14.99MHz: 9.0mm max., 33.00—60.00MHz:7.0mm max.

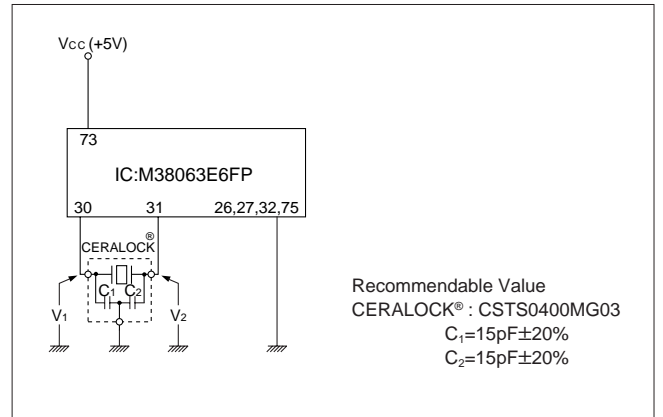## ■THE STABILITY OF OSCILLATION FREQUENCY WITH TEMPERATURE VARIATION

CST12.0MTW

CSTS0400MG03

CST33.86MXW040
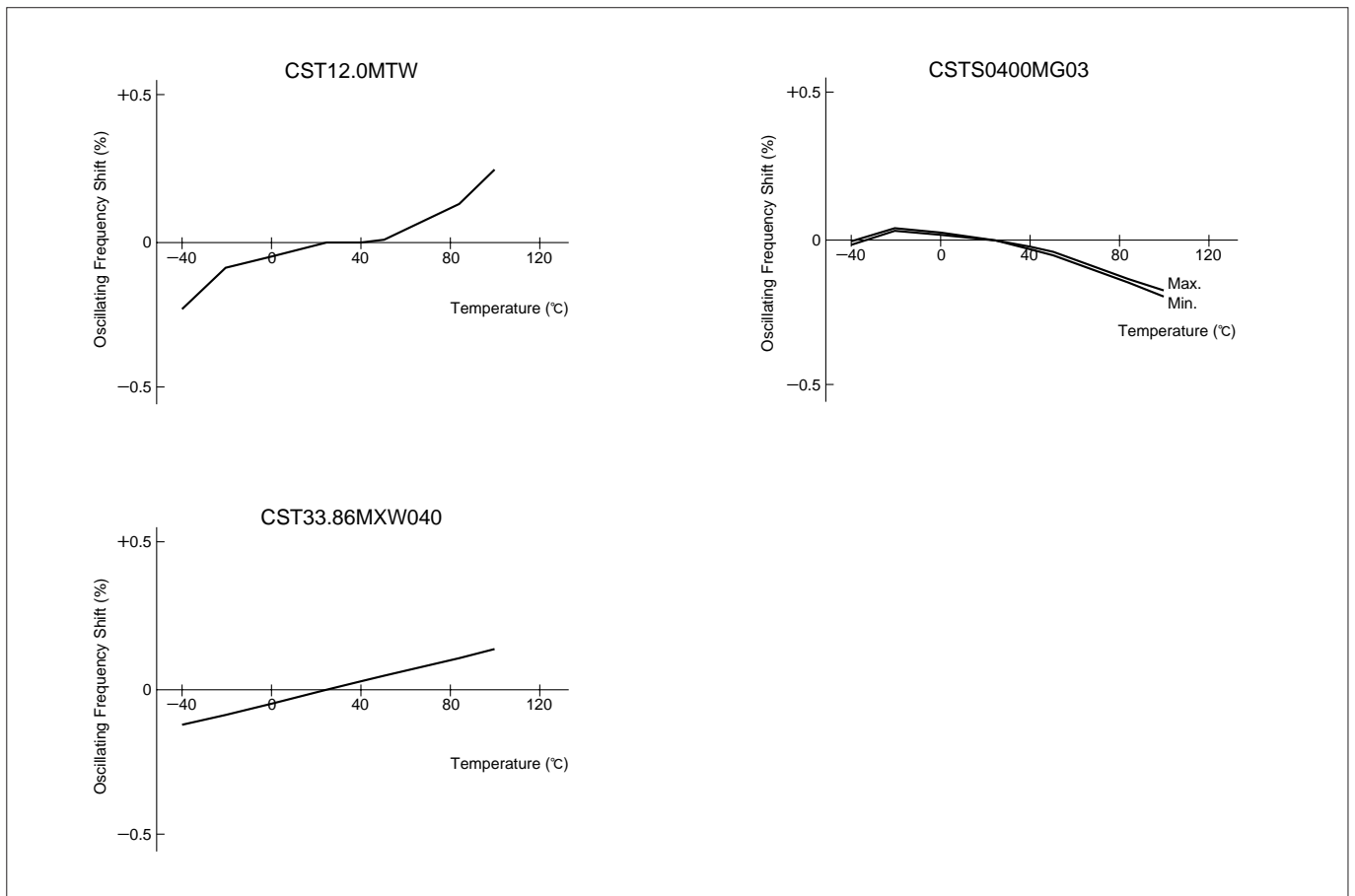
■APPLICATION CIRCUITS UTILIZING THE CERALOCK®

Application to 80C49 (8-bit Microcomputer)

+5V

40 Vcc   26 Vdd

80C49

X₁ 2   X₂ 3   EA 7   ALE 11   Vss 20

CERALOCK®

30pF   30pF

$\frac{1}{15}$Fosc

CSA11.0MTZ
(11MHz)
Can be applied

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

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

Vcc(+5V)

73

IC:M38063E6FP

30   31   26,27,32,75

CERALOCK®

C₁   C₂

V₁   V₂

Recommendable Value
CERALOCK® : CSTS0400MG03
C₁=15pF±20%
C₂=15pF±20%

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

Vcc(+5V)

H

IC:HD64F3434

3   2   L

CERALOCK®

V₁   C₁   C₂   V₂

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

Recommendable Value
CERALOCK® : CSA16.00MXZ040
C₁=22pF
C₂=22pF
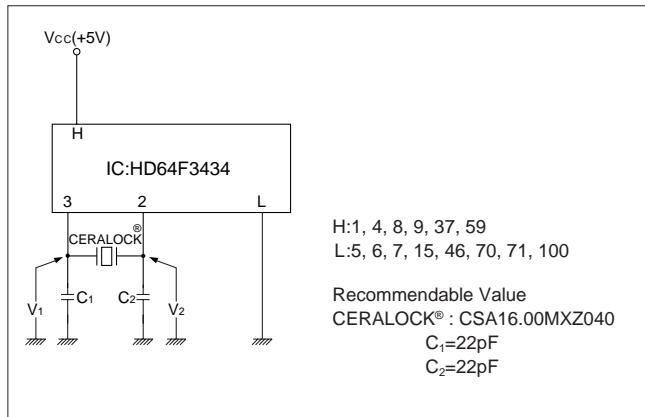
Application to ML66517 (8-bit Microcomputer)

Vdd(+5V)

H

IC:ML66517

37   36   L

CERALOCK®

V₁   C₁   C₂   V₂

H:9, 65
L:10, 35, 55, 75, 76

Recommendable Value
CERALOCK® : CSA20.00MXZ040
C₁=15pF
C₂=15pF
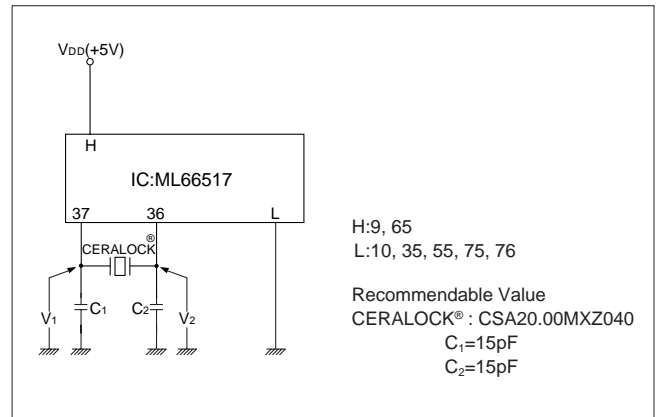
Application to 8085 (8-bit Microcomputer)

+5V $\frac{1}{2}$Fosc

40 Vcc   30 CLK(OUT)

8085A

X₁ 1   X₂ 2   Vss 20

CERALOCK®

30pF   30pF

CERALOCK® : CSA4.00MG
(1) 8085A (INTEL)
(2) μPD8085A (NEC)
(3) TMP8085A (TOSHIBA)
(4) MSM8085A (MITSUBISHI)
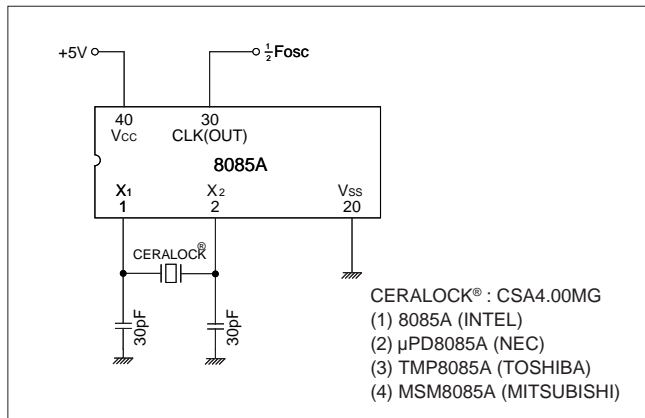
Application to MC68HC705P6 (MOTOROLA) (8-bit Microcomputer)

Vdd(+5V)

H

IC:MC68H705P6

27   26   L

Rf

CERALOCK®

C₁   C₂

V₁   V₂

H:28
L:14

Recommendable Value
CERALOCK® : CSTS0400MG03
C₁=15pF±20%
C₂=15pF±20%
Rf=1MΩ
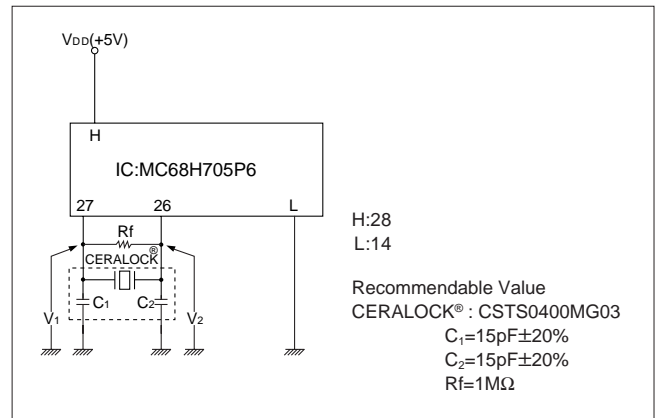
Application to M34550M4 (MITSUBISHI) (Remote Control Unit)

Vcc(+3.0V)

33,36

IC:M34550M4

30   31   L

CERALOCK®

V₁   C₁   C₂   V₂

L:13—27, 29, 32, 37—40

Recommendable Value
CERALOCK® : CSB455E
C₁=220pF
C₂=220pF
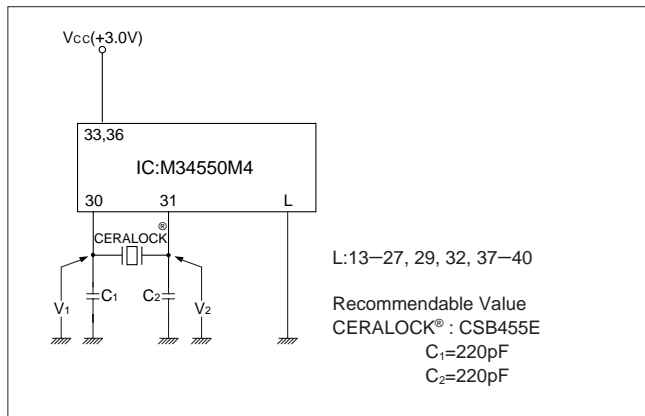
Application to TC88402F (TOSHIBA) (Speech Synthesizer)

Vdd=+5V

H

IC:TC88402F

1   2   GND

CERALOCK®

C₁   C₂

V₁   V₂

Recommendable Value
CERALOCK® : CST24.57MXW0H1
C₁=5pF±20%
C₂=5pF±20%
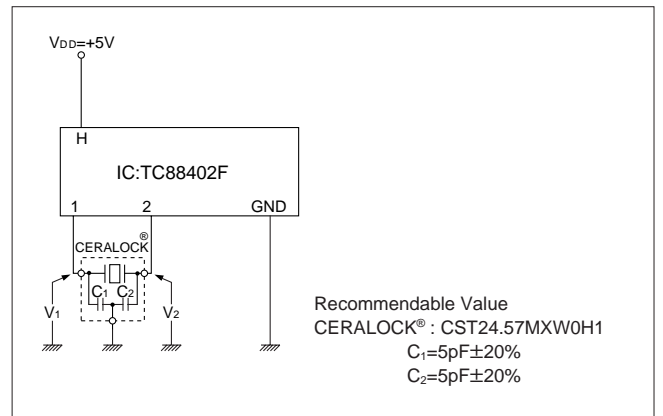
Application to μPD754304GS (4-bit Microcomputer)

$V_{DD}(+5V)$

19,20

IC:μPD754304GS

2　　3　　1,4

CERALOCK®

C_1　C_2

V_1　　　V_2

Recommendable Value
CERALOK® : CSTCC4.00MG
C_1=15pF±20%
C_2=15pF±20%
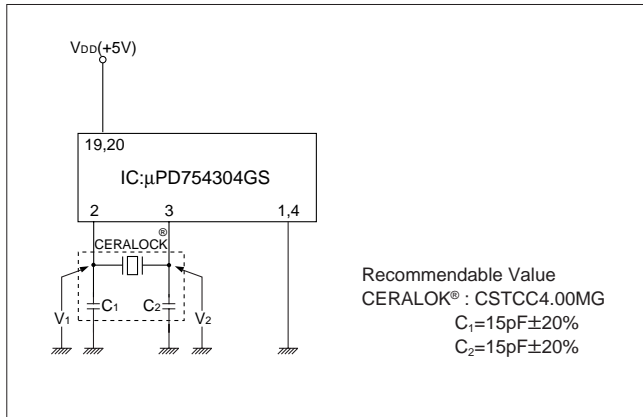
Application to 651104F (SANYO) (4-bit Microcomputer)

$V_{DD}(+5V)$

10

IC:LC651104F

8　　9　　L

CERALOCK®

C_1　C_2

V_1　　　V_2

L:1−7, 11, 16−20, 25, 26, 29

Recommendable Value
CERALOCK® : CSTCC4.00MG0H6
C_1=47pF±20%
C_2=47pF±20%
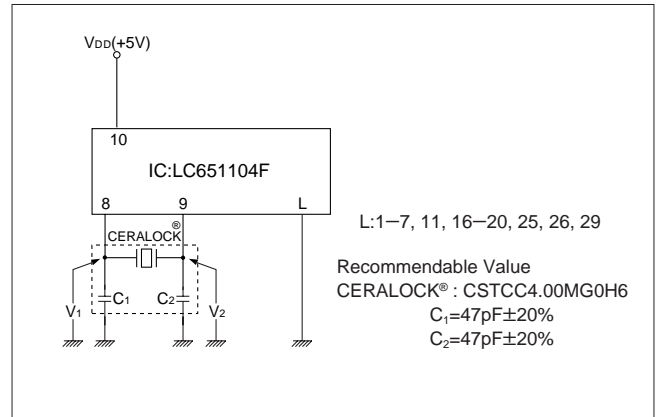
Application to LC7367JM (SANYO) (Tone / Pulse Dialer)

$V_{DD}(+5V)$

H　　2　21

IC:LC7367JM

9　　　10　　L

CERALOCK®

C_1　C_2

V_1　　　V_2

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

Recommendable Value
CERALOCK® : CSTS0358MG36267
C_1=47pF±20%
C_2=47pF±20%
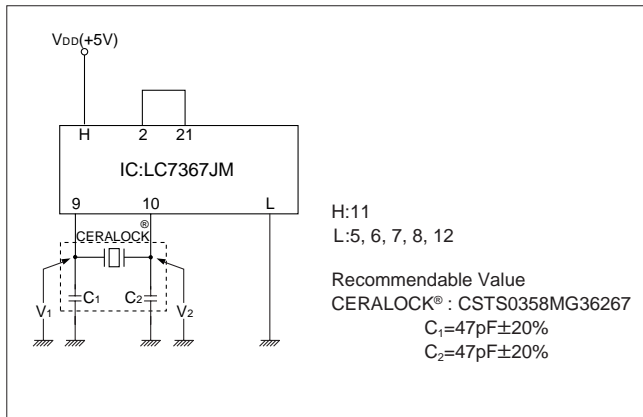
Application to UM95089M (UMC) (Tone / Pulse Dialer)

$V_{CC}(+5V)$

H

IC:UM95089M

7　　8　　L

CERALOCK®

C_1　C_2

V_1　　　V_2

Recommendable Value
CERALOCK® : CSTCC3.58MG36278
C_1=47pF±20%
C_2=47pF±20%
Rf=1MΩ
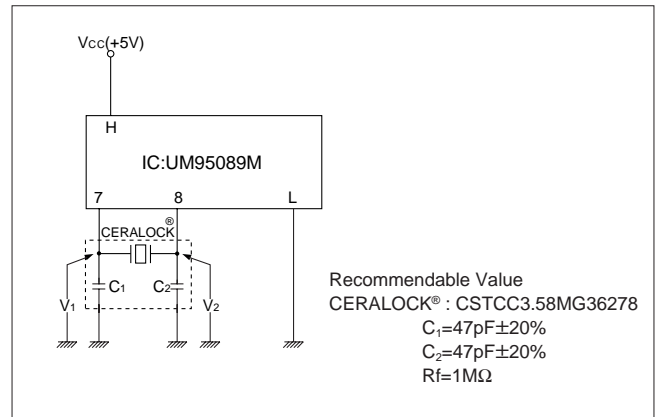
Application to μPD70216H (NEC) (16-bit Microcomputer)

V_{DD}=+5V

H

IC:μPD70216H

54　　53　　18,52,68

CERALOCK®

C_1　C_2

V_1　　　V_2

Recommendable Value
CERALOCK® : CSA32.00MXZ040
C_1=5pF
C_2=5pF
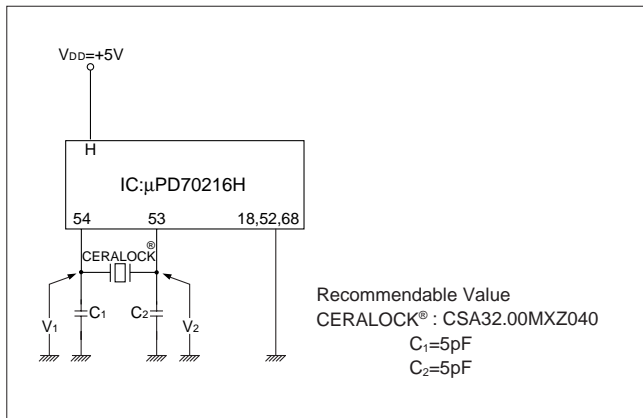
Application to CXD2510Q (SONY) (Digital Signal Processing IC for CD)

$V_{DD}(+5V)$

H

IC:CXD2510Q

53　　54　　L

CERALOCK®

C_1　C_2

V_1　　　V_2

H:33, 37
L:12, 52

Recommendable Value
CERALOCK® : CSA33.86MXZ040
C_1=5pF
C_2=5pF
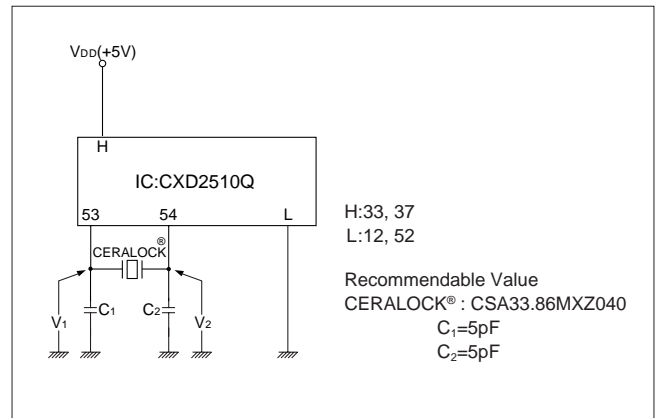
Application to LC895194-X30 (SANYO)

V_{DD}=+5V

H

IC:LC895194-X30

70　　71　　L

Rf

CERALOCK®　Rd

C_1　C_2

V_1　　　V_2

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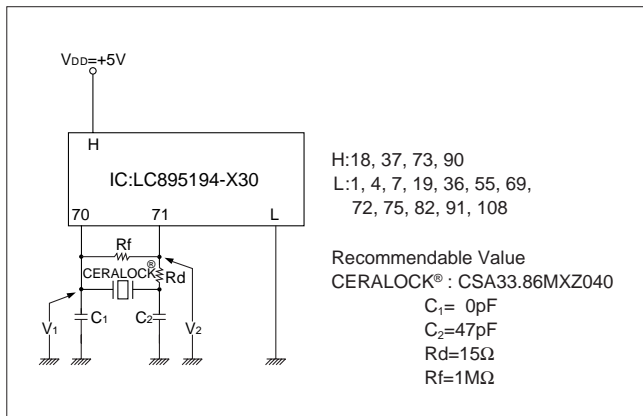
Application to TMP47C443 (TOSHIBA) (4-bit Microcomputer)

$V_{DD}(+5V)$

23

IC:TMP47C443

2　　1　　3

CERALOCK®

C_1 C_2

V_1　　　V_2

Recommendable Value
CERALOCK® : CSTS0400MG03
C_1=15pF±20%
C_2=15pF±20%
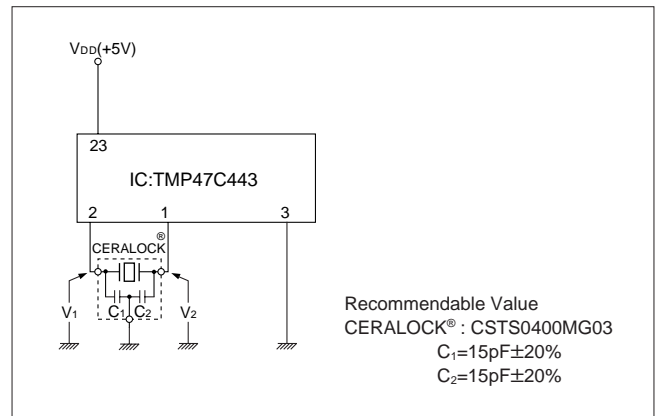
Application to TA8690AN (TOSHIBA)
(TV Horizontal / Vertical Synthesizer Circuit)

Recommendable Value
CERALOCK® : CSB503F46
R_S=150Ω
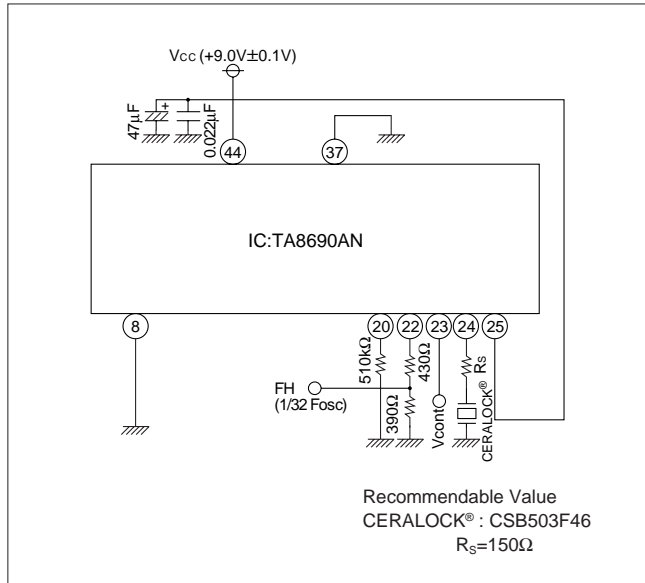
Application to TEA2130 (THOMSON)
(TV Horizontal / Compatible with synthesizer Circuit)

Recommendable Value
CERALOCK® : CSB503F12
R_S=470Ω
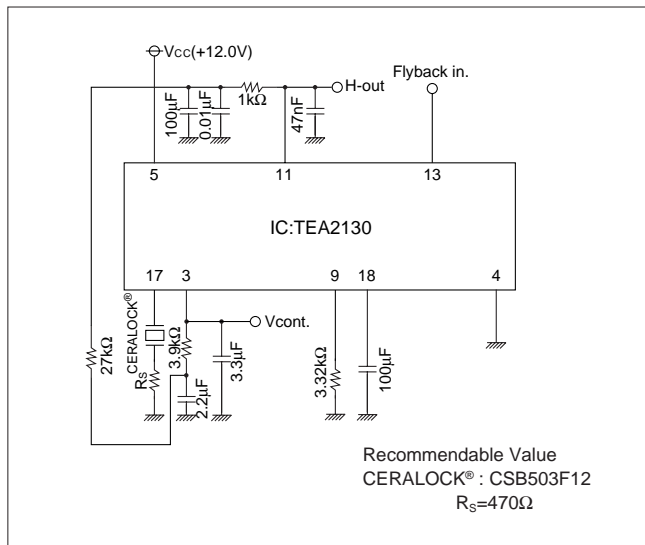
Application to LA3430 (SANYO) (FM Stereo MPX)

Recommendable Value
CERALOCK® : CSB456F15
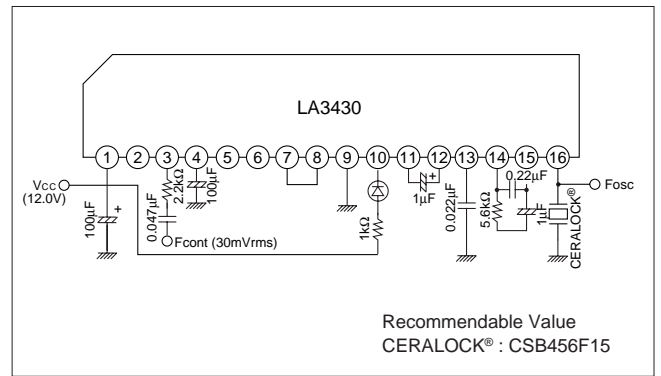
Application to LA7687 (SANYO)
(TV Horizontal Synthesizer Circuit)

Recommendable Value
CERALOCK® : CSB500F55
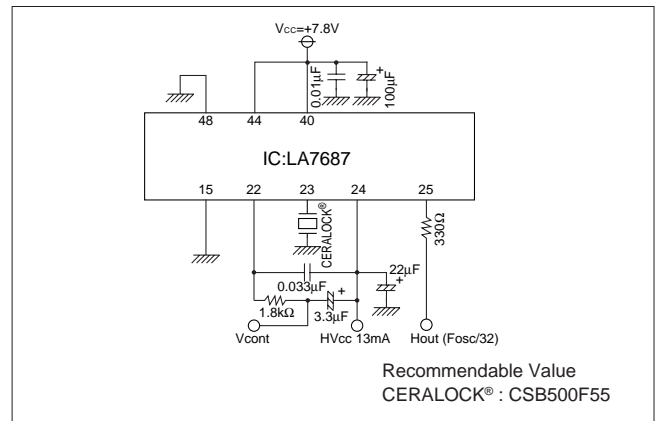
Oscillation Circuit incorporating Transistor

Recommendable Value
CERALOCK® : CSB455E
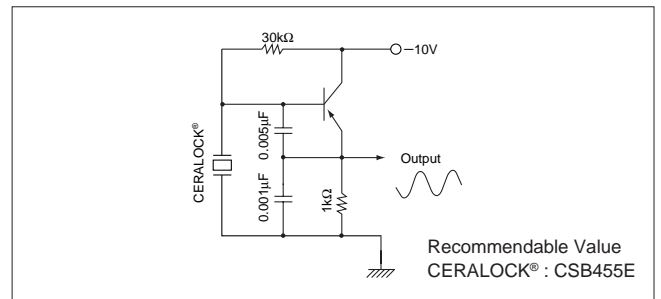
⚠**Note:**

1. Export Control
   ⟨For customers outside Japan⟩
   Murata products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.
   ⟨For customers in Japan⟩
   For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2. Please contact our sales representatives or product engineers before using our products listed in this catalog for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property, or when intending to use one of our products for other applications than specified in this catalog.
   ① Aircraft equipment
   ② Aerospace equipment
   ③ Undersea equipment
   ④ Power plant equipment
   ⑤ Medical equipment
   ⑥ Transportation equipment (vehicles, trains, ships, etc.)
   ⑦ Traffic signal equipment
   ⑧ Disaster prevention / crime prevention equipment
   ⑨ Data-processing equipment
   ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above

3. Product specifications in this catalog are as of March 2000. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before your ordering. If there are any questions, please contact our sales representatives or product engineers.

4. The parts numbers and specifications listed in this catalog are for information only. You are requested to approve our product specification or to transact the approval sheet for product specification, before your ordering.

5. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or third party's intellectual property rights and other related rights in consideration of your using our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.

6. None of ozone depleting substances (ODS) under the Montreal Protocol is used in manufacturing process of us.

muRata Murata Manufacturing Co., Ltd.   http://www.murata.co.jp/products/