

## CERAMIC RESONATORS (CERALOCK®)

### ■ CERALOCK® Frequency Range

Type	Series	Built-in Capacitor	Frequency Range
Chip 3 terminals	CSTC□MG	○	2M—6MHz
	CSTCS□MG*/MT/MX	○	3M—34.0MHz
Chip 2 terminals	CSAC□MGC/MGCM	—	1.8M—6MHz
	CSACS□MT/MX	—	6.01M—50MHz
SMD type	CSBF□J	—	430k—500kHz
			700k—1250kHz*
2 terminals	CSB□P/E/D/J	—	190k—1250kHz
	CSA□MK/MG/MTZ/MXZ	—	1.26M—50MHz
3 terminals	CSU□P	○	450k—500kHz
	CST□MG/MGW/MTW/MXW	○	1.8M—35.99MHz

\* Unavailable for certain frequency ranges. Please consult us for details.

### ■ Part Numbering

Ex.) **CSA** **4.00** **MG** **100** - **TF01**

① ② ③ ④ ⑤

#### ① Series

CSA (C/CS) : MHz band CERALOCK® (The added C/CS indicates chip type)

CST (C/CS) : MHz band CERALOCK® with built-in capacitors (C/CS indicates chip type)

CSB (F) : kHz band CERALOCK® (The added F indicates SMD type)

CSU : kHz band CERALOCK® with built-in capacitors

#### ② Oscillation frequency

③ Type (indicates vibration mode with different dimensions. Please see the pictures.)

④ Individual specifications (Frequency tolerance, applied IC, terminal shape, reliability, etc)

#### ⑤ Taping or magazine

Standard suffixes are as follows:

CSA/T type -TF01

CSB (F) type -CA01 (Magazine) or -TC01 (Taping)

Chip type -TC

### ■ Packaging Quantity

#### • Taping

Part Number	Type	Frequency	Package Quantity	Suffix
CSBF	J	430— 500kHz	1500	-TC01
		700— 1250kHz	3000	
CSA	MG	1.80— 2.44MHz	1000	-TF01
		2.45— 6.30MHz	1500	
CST	MTZ/MXZ	6.31—32.00MHz	1500 <sup>1)</sup>	-TF01
	MG	1.80— 2.44MHz	1000	
	MGW	2.45— 6.30MHz	1500	
CSAC	MGC/MGCM	1.80— 6.00MHz	1500	-TC
		CSACS	MT/MX	
CSTCS	MG/MT/MX	2.00—35.99MHz	1000 <sup>2)</sup>	
CSTCV				

<sup>1)</sup> 1000 pcs. exceptionally available.

<sup>2)</sup> CSTCS□MG (3.00—6.00MHz): 2000 pcs.

#### • Bulk

500 pcs.

(100 pcs. for 190 to 374kHz frequency: CSB□□□D series and 1,000 pcs. 700 to 1250kHz frequency: CSB□□□J series.)

## CERAMIC RESONATORS (CERALOCK®)

### CSA Series 1.26MHz—50MHz

Frequency	1.26—1.79MHz	1.80—2.44MHz	2.45—6.30MHz	6.31—13.00MHz	12.00—32.00MHz	32.01—50.00MHz
Part Number	CSA□□□MK	CSA□□□MG	CSA□□□MG	CSA□□□MTZ	CSA□□□MXZ040	CSA□□□MXZ040
Washability	Non-Washable	Washable	Washable	Washable	Washable	Washable
Dimensions (in mm)						

The resonators are washable. However, temperature, time and other processing conditions should be checked to ensure that suitable electrical characteristics are maintained.

### CSB Series 190kHz—1250kHz

Non-Washable	Frequency	—		375~429kHz	430~509kHz	510~699kHz	—
	Part Number	—		CSB□□□P	CSB□□□E	CSB□□□P	—
Dimensions (in mm)	—					—	
Washable	Frequency	190—249kHz	250—374kHz	375—429kHz	430—519kHz	520—699kHz	700—1250kHz
	Part Number	CSB□□□D	CSB□□□D	CSB□□□J	CSB□□□J	CSB□□□J	CSB□□□J
	Washability	Washable*	Washable*	Washable	Washable	Washable	Washable
	Dimensions (in mm)						

\* Ultrasonic wash is not applicable.

The resonators are washable. However, temperature, time and other processing conditions should be checked to ensure that suitable electrical characteristics are maintained.

#### CSA Series for MOS

Part Number	Freq. Range (MHz)
CSA□□□MK	1.26—1.79
CSA□□□MG	1.80—6.30
CSA□□□MTZ	6.31—13.0
CSA□□□MXZ040	13.01—50.0

C1=C2=30pF (In the case of MXZ040 the capacitance varies according to the frequencies)  
□: Frequency  
For tape carrier packaging, "-TF01 (Flat pack)" or "-TR01 (Reel)" should be added at the end of the part number.  
(MG, MTZ and MXZ only)

#### CSA Series for TTL

Part Number	Freq. Range (MHz)
CSA□□□MK011	1.26—1.79
CSA□□□MG011	1.80—6.30
CSA□□□MTZ011	6.31—11.9
CSA□□□MXZ011	12—30

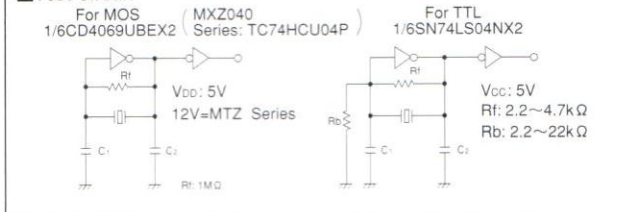
□: Frequency  
C1, C2: Adjustment is necessary, depending on the frequency characteristics.

#### CSB Series

Part Number		Frequency Range (kHz)	C1 (pF)	C2 (pF)
Non-washable	—	190—249	330	470
washable	CSB□□□D	250—374	220	470
—	CSB□□□J	375—429	120	470
CSB□□□P	CSB□□□J	430—509	100	100
CSB□□□E	CSB□□□J	510—699	100	100
CSB□□□P	CSB□□□J	700—1250	100	100

□: Frequency  
CSB□□□J type (700—1250kHz) requires damping resistor (5.6kΩ)  
Processing conditions should be checked carefully before cleaning.

#### Test Circuit



#### Characteristics

Type	Series	Frequency Accuracy (at 25°C)	Stability in Temperature (-20 to +80°C)	Aging (for ten years)
CSA	MK/MG Series	±0.5%	±0.3%	±0.3%
	MTZ Series	±0.5%	±0.5%	±0.5%
	MXZ040 Series	±0.5%	±0.3%	±0.3%
CSB	Non-washable	±2kHz	±0.3%	±0.5%
	Washable	190—374kHz: ±1kHz 375—1250kHz: ±0.5%	±0.3%	±0.5%

## CERAMIC RESONATORS (CERALOCK®)

### With Built-in Load Capacitance CSU/CST Series

Frequency	450—500kHz	1.80—2.44MHz	2.45—6.30MHz	6.31—13.00MHz	13.01—35.99MHz
Part Number	CSU□□□P	CST□□□MG	CST□□□MGW	CST□□□MTW	CST□□□MXW040
Washability	Non-washable	Washable <sup>4)</sup>	Washable <sup>4)</sup>	Washable <sup>4)</sup>	Washable <sup>4)</sup>
Dimensions (in mm)					

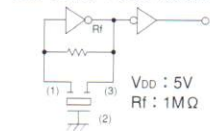
<sup>1)</sup> 6.01—7.99MHz: 9.0 max. <sup>2)</sup> 13.01—14.99MHz: 9.0 max. <sup>3)</sup> 33.00—35.99MHz: 7.0 max. <sup>3)</sup> Terminals have directivity 1 Input 2 Ground 3 Output  
<sup>4)</sup> The resonators are washable. However, temperature, time and other processing conditions should be checked to ensure that suitable electrical characteristics are maintained.

### Characteristics

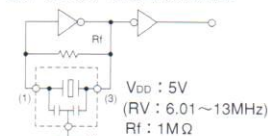
Type	Frequency Range	Frequency Accuracy (at 25°C)	Stability in Temperature (-20 to +80°C)	Aging (for ten years)
CSU	450—500kHz	±2kHz	±0.3%	±0.3%
	1.80—6.30MHz	±0.5%	±0.3%	±0.3%
CST	6.31—13.0MHz	±0.5%	±0.4%	±0.3%
	13.01—35.99MHz	±0.5%	±0.3%	±0.3%

### Test Circuits

CSU Series 1/6CD4069UBEX2



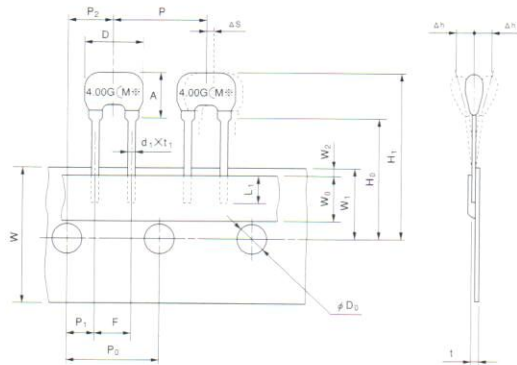
CST Series 1/6CD4069UBEX2



Please take care in connecting because the CSU series has directivity. Please note that the CST series oscillates stably even if it is connected the wrong way, but wrong connection may cause a little frequency lag.

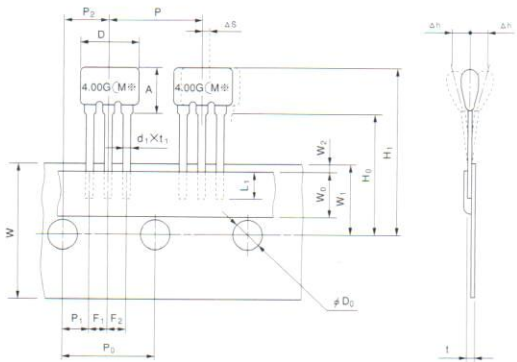
### Radial Taping Dimensions

CSA4.00MG-TF01



Item	Code	Dimensions (mm)	Note
Body Diameter	D	10.0max.	
Body Height	A	7.5max.	
Lead Dimensions	d <sub>1</sub> ×t <sub>1</sub>	0.5×0.3(±0.1)	
Portion To Cut in Case of Defect	L <sub>1</sub>	3.0 min.	
Pitch of Component	P	12.7±0.5	
Pitch of Sprocket Hole	P <sub>0</sub>	12.7±0.2	10×P <sub>0</sub> =127±1
Length from Hole Center to Lead	P <sub>1</sub>	3.85±0.5	
Length from Hole Center to Component Center	P <sub>2</sub>	6.35±0.5	
Lead Spacing	F	5.0 ± <sub>0.2</sub> <sup>0.5</sup>	
Deviation across Tape	Δh	0±0.1	
Carrier Tape Width	W	18.0±0.5	
Hold-down Tape Width	W <sub>0</sub>	6.0 min.	
Position of Sprocket Hole	W <sub>1</sub>	9.0±0.5	
Hold-down Tape Width	W <sub>2</sub>	0 ± <sub>0.5</sub> <sup>0.5</sup>	
Lead Distance between Reference and Bottom Planes	H <sub>0</sub>	18.0±0.5	
Distance between Reference and Top	H <sub>1</sub>	26.0 max.	
Diameter of Sprocket Hole	D <sub>0</sub>	φ 4.0±0.2	
Total Tape Thickness	t	0.6±0.2	
Deviation across Body Center	Δs	0±0.1	

CST4.00MGW-TF01



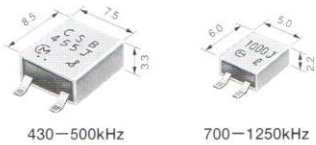
Item	Code	Dimensions (mm)	Note
Body Diameter	D	10.0 max.	
Body Height	A	6.0 max.	
Lead Dimensions	d <sub>1</sub> ×t <sub>1</sub>	0.5×0.3(±0.1)	
Portion To Cut in Case of Defect	L <sub>1</sub>	3.0 min.	
Pitch of Component	P	12.7±0.5	
Pitch of Sprocket Hole	P <sub>0</sub>	12.7±0.2	10×P <sub>0</sub> =127±1
Length from Hole Center to Lead	P <sub>1</sub>	3.85±0.5	
Length from Hole Center to Component Center	P <sub>2</sub>	6.35±0.5	
Lead Spacing	F <sub>1</sub>	2.5±0.2	
	F <sub>2</sub>	2.5±0.2	
Deviation across Tape	Δh	0±0.1	
Carrier Tape Width	W	18.0±0.5	
Hold-down Tape Width	W <sub>0</sub>	6.0 min.	
Position of Sprocket Hole	W <sub>1</sub>	9.0±0.5	
Hold-down Tape Width	W <sub>2</sub>	0 ± <sub>0.5</sub> <sup>0.5</sup>	
Lead Distance between Reference and Bottom Planes	H <sub>0</sub>	18.0±0.5	
Distance between Reference and Top	H <sub>1</sub>	24.5 max.	
Diameter of Sprocket Hole	D <sub>0</sub>	φ 4.0±0.2	
Total Tape Thickness	t	0.6±0.2	
Deviation across Body Center	Δs	0±0.1	

## CERAMIC RESONATORS (CERALOCK®)

### kHz band SMD Type

#### CSBF Series (430kHz—1250kHz)

• Reflow soldering and mounting by automatic placers.



(in mm)

Part Number	Frequency Range	Frequency Tolerance (25°C)	Temperature Stability (-20°C to +80°C)
CSBF□J	430—500kHz	±0.5%	±0.3%
CSBF□J	700—1250kHz*	±0.5%	±0.3%

\* Unavailable for certain frequency ranges.

### Chip 2-Terminal Type

#### CSAC/CSACS Series (1.80MHz—33.86MHz)



(CSAC□MGC) (CSAC□MGCM) (CSACS□MT/MX)  
(in mm) \*The thickness varies depending on frequency.

Part Number	Frequency Range	Frequency Tolerance (25°C)	Temperature Stability (-20°C to +80°C)
CSAC□MGC/MGCM	1.80—6.00MHz	±0.5%	±0.3%
CSACS□MT	6.01—13.0MHz	±0.5%	±0.5%
CSACS□MX	14.00—50.00MHz	±0.5%	±0.3%

### Chip 3-Terminal Type

#### CSTC/CSTCS Series



(CSTC□MG) (CSTCS□MG) (CSTCS□MT/MX)  
(in mm) \*The thickness varies depending on frequency.

Part Number	Frequency Range	Frequency Tolerance (25°C)	Temperature Stability (-20°C to +80°C)
CSTC□MG	2.00—6.00MHz	±0.5%	±0.3%
CSTCS□MG	3.00—6.00MHz*	±0.5%	±0.3%
CSTCS□MT	6.01—13.00MHz	±0.5%	±0.4%
CSTCS□MX	14.00—34.00MHz	±0.5%	±0.3%

\* Unavailable for certain frequency ranges.

### Ultra-Miniature Chip Type

#### CSACV/CSTCV Series



(CSACV□MT/MX) (CSTCV□MT/MX)  
(in mm) \*The thickness varies depending on frequency.

Part Number	Frequency Range	Frequency Tolerance (25°C)	Temperature Stability (-20°C to +80°C)
CSACV□MT	8.00—13.00MHz	±0.5%	±0.5%
CSACV□MX	16.00—33.86MHz	±0.5%	±0.3%

Part Number	Frequency Range	Frequency Tolerance (25°C)	Temperature Stability (-20°C to +80°C)
CSTCV□MT	8.00—13.00MHz	±0.5%	±0.4%
CSTCV□MX	16.00—33.86MHz	±0.5%	±0.3%

### For TV Horizontal Synthesizer Circuits



(in mm)

Part Number	Freq. Accuracy (at 25°C)	Applicable IC
CSB503F2	503.5±2kHz	μ PC1401 (NEC)
CSB503F5	504.5±2kHz	LA7620 (SANYO)
CSB503F6	519±2kHz*	M51307 (MITSUBISHI)
CSB503F10	15.734kHz±0.5%	TA7777P (TOSHIBA)
CSB503F12	503.5kHz±2kHz	TDA3586 (THOMSON)
CSB503F15	505.1kHz±2kHz	LA7650 (SANYO)
CSB503F30	503.5kHz±1.5kHz	TA8654AN (TOSHIBA)
CSB503F38	15.734kHz±62Hz	AN5302 (MATSUSHITA)
CSB500F2	500.0±2kHz	μ PC1401 (NEC)
CSB500F9	500.0±2kHz	M51308SP (MITSUBISHI)
CSB500F13	500.0±2kHz	M51367SP (MITSUBISHI)
CSB500F25	15.680kHz±0.4%	LA7680 (SANYO)
CSB500F40	15.680kHz±0.4%	TA8691N (TOSHIBA)
CSB500F55	15.680kHz±0.4%	LA7685 (SANYO)

\* Specification for resonant frequencies.

EMI SUPPRESSION  
FILTERS (EMFIL®)

MICROWAVE  
COMPONENTS

FILTERS

VIDEO EQUIPMENT

FUNCTIONAL MODULES  
HYBRID ICs

POWER SUPPLIES

SENSORS

CAPACITORS

THERMISTORS  
/RESISTORS

COILS/DELAY LINES  
/FERRITE CORES

RESONATORS

PIEZO PRODUCTS

EMI SUPPRESSION FILTERS (EMIFIL®)  
MICROWAVE COMPONENTS  
FILTERS  
VIDEO EQUIPMENT  
FUNCTIONAL MODULES HYBRID ICs  
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RESONATORS  
PIEZO PRODUCTS

## CERAMIC RESONATORS (CERALOCK®)

### For FM Multiplexers



CSB456F  
Type  
(in mm)

Part Number	Freq. Tolerance (at 25°C)	Applicable IC
CSB456F14	19.000kHz±38Hz	TA7413AP (TOSHIBA)
CSB456F15	19.000kHz±38Hz	LA3430 (SANYO)
CSB456F16	19.000kHz±38Hz	TA8122AN (TOSHIBA)
CSB456F18	19.000kHz±38Hz	TA8132N (TOSHIBA)
CSB456F23	456kHz±0.25%	LA1886 (SANYO)
CSB912JF101	918.5kHz±0.3%*	AN7291 (MATSUSHITA)

\* Anti-Resonant Frequency.

### For AM Stereo Decoders



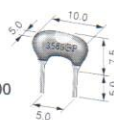
CSA3.60MGF  
Type  
(in mm)

Part Number	Freq. Tolerance (at 25°C)	Applicable IC
CSA3.60MGF102	3.600MHz±0.3%	MC13020P (MOTOROLA)
CSA3.60MGF103	3.600MHz+0.2/-0.4%	MC13022P (MOTOROLA)

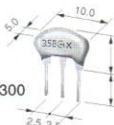
### For D. T. M. F. Generators



CSB480E14



CSA3.58MG300  
Series



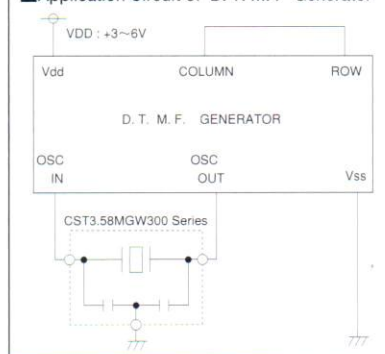
CST3.58MGW300  
Series  
(in mm)

Part Number	Freq. Tolerance (at 25°C)	Applicable IC
CSB480E14	+0.2 -0.4%	TC31018P (TOSHIBA)
CSA3.58MG310VA	+0.2 -0.4%	PCD3311 (PHILIPS)
CSA3.58MG300 Series	±0.3%	D.T.M.F. IC
CST3.58MGW300 Series	±0.3%	D.T.M.F. IC

• CSA3.58MG300/CST3.58MGW300 series are classified into ranks A through G to match various D.T.M.F. ICs. They are identified by color marking on the top of the resonator.

Rank	A	B	C	D	E	F	G
Marking Color	Black	Blue	Red	Orange	White	Purple	Green

#### Application Circuit of D. T. M. F. Generator



### For FDD



CSBF491J205



CSBF983J205

(in mm)

Part Number	Freq. Tolerance (at 25°C)	Applicable IC
CSBF491J205	491.52kHz±0.2%	M56638 (MITSUBISHI)
CSBF616J201	616.50kHz±0.2%	M51784P (MITSUBISHI)
CSBF983J205	983.04kHz±0.2%	HA13468MP (HITACHI)
CSBF1000JH224	1000.0kHz±0.2%	BA6496A (ROHM)
CSA5.89MG202	5.898MHz±0.2%	HA13441 (HITACHI)

### For Automotive



CSAC4.00MGCMA



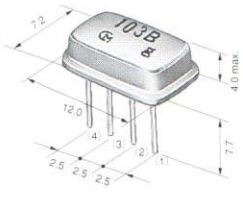
CSTC4.00MGA

(in mm)

Part Number	Type	Frequency
CSB	JA	375—1250kHz
CSA	MGA/MTZA/MXZA	1.80—32.0MHz
CST	MGA/MGWA	1.80—6.30MHz
	MTWA/MXWA	6.01—24.0MHz
CSAC	MGCA/MGCMA	2.00—6.00MHz
CSTC	MGA	2.00—6.00MHz
CSACS	MTA	6.01—13.00MHz
	MXA	14.0—33.86MHz
	MTA	6.01—13.00MHz
CSTCS	MTA	6.01—13.00MHz
	MXA	14.0—33.86MHz

## SURFACE ACOUSTIC WAVE RESONATORS

### ■ CATV Converter FSK Demodulators



- (1) NC
- (2) Hot
- (3) Case GND
- (4) Cold

SAR103MB40X

(in mm)

Part Number	Resonant Loss (dB) max.	Resonant Frequency (MHz)	Parallel Capacitance (pF)	Temperature Coefficient (ppm/C) max.
SAR84MB40X	2.8	83.69	5.2	±8
SAR99MB40X	2.4	99.29	4.6	±8
SAR103MB40X	2.4	103.29	6.0	±8
SAR117MB40X	2.4	117.187	5.2	±8

■ Packaging Quantity: 100 pcs.

### ■ CATV Converter Second Local Oscillators



SAR674.0MDA30X200

(in mm)

Part Number	Resonant Loss (dB) max.	Center Frequency (MHz)	Parallel Capacitance (pF)	Temp. Coef. of Resonant Freq. (ppm/C) max.
SAR668.0MDA30X200	10.0	668.0	1.9	±5
SAR674.0MDA30X200	10.0	674.0	2.0	±5

■ Packaging Quantity: 100 pcs.

### ■ For Remote Control/Security

#### • 1-Port Type



- (1) NC
- (2) Hot
- (3) Case GND
- (4) Cold

SAR224.5MB40X200

Part Number	Resonant Loss (dB) max.	Resonant Frequency (MHz)	Parallel Capacitance (pF)	Temperature Coefficient (ppm/C) max.
SAR224.5MB40X200	2.0	224.46	3.9	±8
SAR300.0MB40X250	2.0	299.95	3.1	±8
SAR418.0MB40X250	2.5	417.95	2.5	±8
SAR433.9MB40X250	2.5	433.87	2.5	±8

• Parallel capacitance should be at 1MHz.

#### • 2-Port Type



SAR433.9MDA30X250

(in mm)

Part Number	Resonant Loss (dB) max.	Center Frequency (MHz)	Parallel Capacitance (pF)	Temp. Coef. of Resonant Freq. (ppm/C) max.
SAR224.5MDA30X200	12.5	224.5	1.65	±5
SAR300.0MDA30X250	12.5	300.0	1.65	±5
SAR418.0MDA30X250	12.0	418.0	1.65	±5
SAR433.9MDA30X250	12.0	433.92	1.65	±5

- Phase shift is 180 degrees.
- Input/output capacitance value is measured at 1MHz.

■ Packaging Quantity: 100 pcs.

EMI SUPPRESSION FILTERS (EMIFIL®)

MICROWAVE COMPONENTS

FILTERS

VIDEO EQUIPMENT

FUNCTIONAL MODULES HYBRID ICs

POWER SUPPLIES

SENSORS

CAPACITORS

THERMISTORS /RESISTORS

COILS/DELAY LINES /FERRITE CORES

RESONATORS

PIEZO PRODUCTS