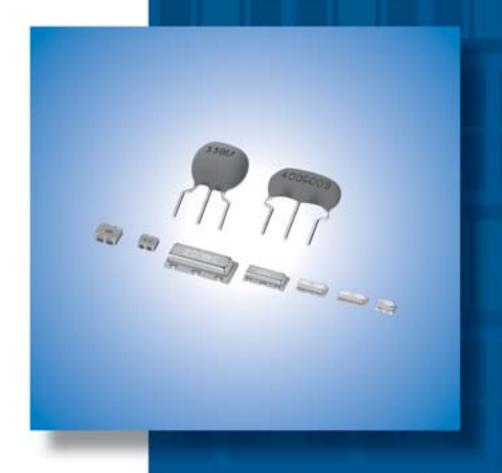


Ceramic Resonators (CERALOCK®)



muRata

Innovator in Electronics

Murata
Manufacturing Co., Ltd.

Cat.No.P16E-22

EU RoHS Compliant

- \cdot All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment."
- · For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).



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CERALOCK $^{\circledcirc}$, CERALOCK(R) and "CERALOCK" in this catalog are the trademarks of Murata Manufacturing Co., Ltd.

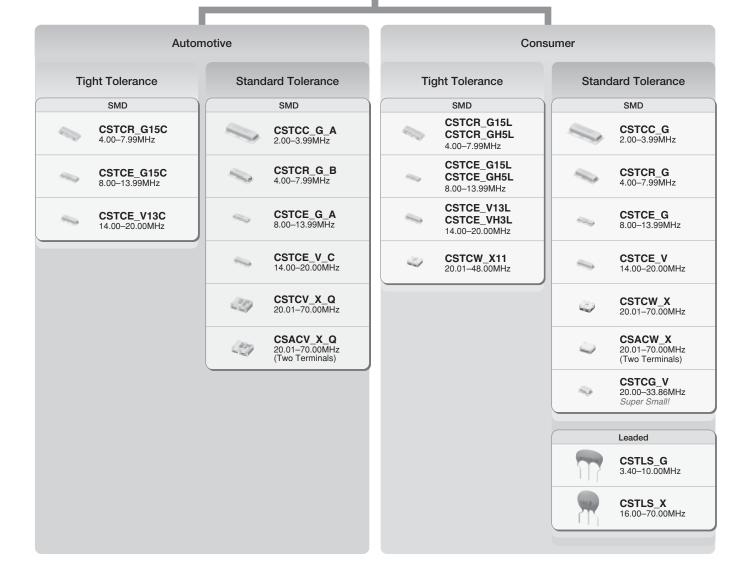
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Selection Guide

Applications



Notice: "CERALOCK® for consumer" and "CERALOCK® for automotive" is different in the specification of Operating Temperature Range, Environmental Characteristics, Physical Characteristics and so on. Please choose either "for consumer" or "for automotive" according to the required specification.



Part Numbering

CERALOCK® (MHz)

(Part Number) CS T CE 16M0 V 5 3 *** -R0

Product ID

Product ID	
cs	Ceramic Resonators

2 Frequency/Capacitance

Code	Frequency/Capacitance
Α	MHz with No Capacitance Built-in
Т	MHz with Built-in Capacitance

3Structure/Size

Code	Structure/Size	
LS	Round Lead Type	
CC	Cap Chip Type	
CR/CE/CG	Small-cap Chip Type	
CV	Monolithic Chip Type	
CW	Small Monolithic Chip Type	

4 Nominal Center Frequency

Expressed by four-digit alphanumerics. The unit is in hertz (Hz). Decimal point is expressed by capital letter "M."

6 Design

Code	Design
G□□	Thickness Shear mode
T/V□□	Thickness Expander mode
X□□	Thickness Expander mode (3rd overtone)

□□ indicates initial frequency tolerance and load capacity.

6 Initial Frequency Tolerance

Code	Initial Frequency Tolerance
5	±0.5%
3	±0.3%
2	±0.2%
1	±0.1%
Н	±0.07%

DLoad Capacity

Code	Load Capacity
1	5/6pF
2	10pF
3	15pF
4	22pF
5	30/33/39pF
6	47pF

8 Individual Specification

Code	Individual Specification
***	Three-digit alphanumerics express "Individual Specification."

With standard products, "3 Individual Specification" and "9 Packaging" is omitted.

Packaging

Code	Packaging
-B0	Bulk
-A0	Radial Taping H₀=18mm
-R0	Plastic Taping ø=180mm
-R1	Plastic Taping ø=330mm

Radial taping is applied to lead type and plastic taping to chip type.



Ceramic Resonators (CERALOCK®)



MHz Chip Type -Tight Frequency Tolerance for Automotive-

Chip type CERALOCK(R) with built-in load capacitors provides high accuracy in an extremely small package. MURATA's frequency adjustment and package technology expertise has enabled the development of the chip CERALOCK(R) with built-in load capacitors.

This diverse series owes its development to MURATA's original mass production techniques and high reliability, and has achieved importance in the worldwide automotive market.

■ Features

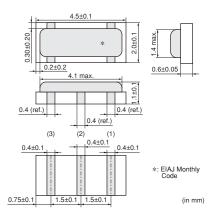
- 1. The series are high accuracy resonators whose total tolerance is available for less than ±3,000ppm.
- 2. The series has high reliability and is available for a wide temperature range.
- 3. Oscillation circuits do not require external load capacitors.
- 4. The series is available for a wide frequency range.
- 5. The resonators are extremely small and have a low profile.
- 6. No adjustment is necessary for oscillation circuits.

Applications

- 1. Cluster panel and Control panel
- 2. Safety control
 (Anti-lock Brake System, Electronic Stability
 Control, Airbag, etc.)
- 3. Engine ECU, Electronic Power Steering, Immobilizer, etc.
- 4. Car Air conditioner, Power Window, Remote Keyless Entry system, etc.
- 5. Intelligent Transportation System (Lane Keeping System, Millimeter wave radar, etc.)
- 6. Battery control for hybrid cars

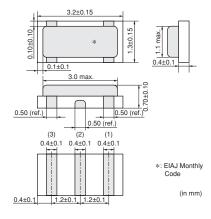


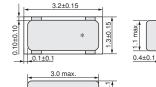
CSTCR_G15C 4.00-7.99MHz



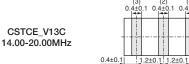


CSTCE_G15C 8.00-13.99MHz







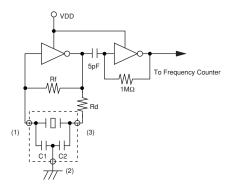




Part Number	Oscillating Frequency (MHz)	Initial Tolerance	Temperature Stability (%)	Temperature Range (°C)
CSTCR_G15C	4.00 to 7.99	±0.1%	±0.13	-40 to 125
CSTCE_G15C	8.00 to 13.99	±0.1%	±0.13	-40 to 125
CSTCE_V13C	14.00 to 20.00	±0.1%	±0.13	-40 to 125

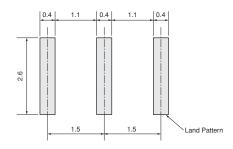
Irregular or stopped oscillation may occur under unmatched circuit conditions. Please check the actual conditions prior to use.

■ Oscillation Frequency Measuring Circuit

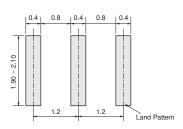


■ Standard Land Pattern Dimensions

CSTCR_G15C (* This Land Pattern is not common to CSTCR_G.)

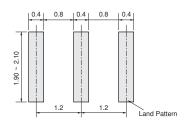


CSTCE_G15C



(in mm)

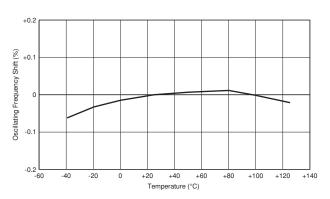
CSTCE_V13C (* This Land Pattern is not common to CSTCE_V.)

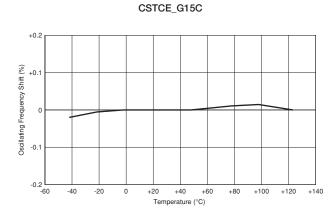


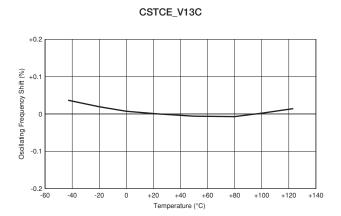
(in mm)

(in mm)

■ Oscillation Frequency Temperature Stability CSTCR_G15C



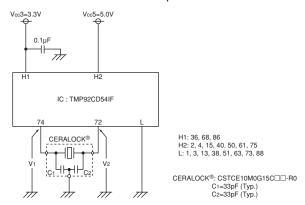




Application Circuits Utilization

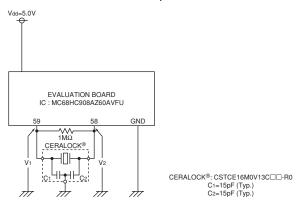
■ TMP92CD54IF (Toshiba)

16-bit Microcomputer



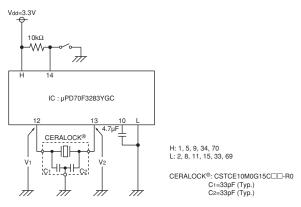
■ MC68HC908AZ60AVFU (Freescale)

8-bit Microcomputer



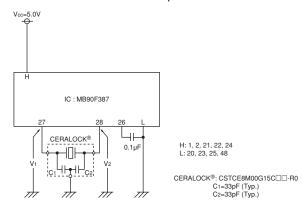
■ µPD70F3283YGC (Renesas)

32-bit Microcomputer



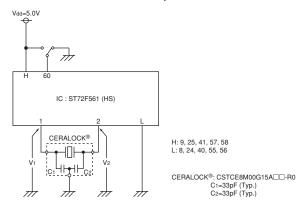
■ MB90F387 (Fujitsu)

16-bit Microcomputer



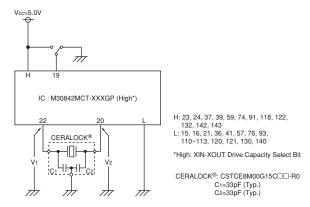
■ ST72F561 (HS) (ST Microelectronics)

8-bit Microcomputer



■ M30842MCT-XXXGP (Renesas)

16-bit Microcomputer



Ceramic Resonators (CERALOCK®)



MHz Chip Type -Standard Frequency Tolerance for Automotive-

Chip type CERALOCK(R) with built-in load capacitors provides high accuracy in an extremely small package. MURATA's frequency adjustment and package technology expertise has enabled the development of the chip CERALOCK(R) with built-in load capacitors.

This diverse series owes its development to MURATA's original mass production techniques and high reliability. and has achieved importance in the worldwide automotive market.

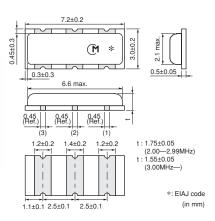
■ Features

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

Applications

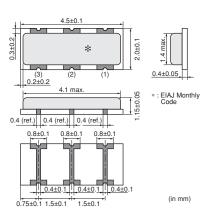
- 1. Cluster panel and Control panel
- 2. Safety control (Anti-lock Brake System, Electronic Stability Control, Airbag, etc.)
- 3. Engine ECU, Electronic Power Steering, Immobilizer,
- 4. Car Air conditioner, Power Window, Remote Keyless Entry system, etc.
- 5. Electronic Toll Collection system, Car Navigation, etc.





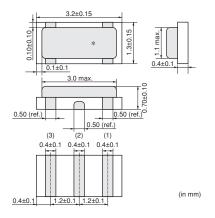


CSTCR G B 4.00-7.99MHz



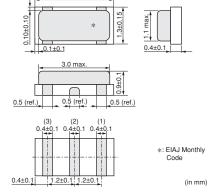


CSTCE G A 8.00-13.99MHz





CSTCE_V_C 14.00-20.00MHz

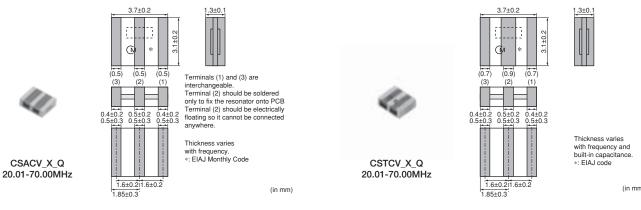


3.2±0.15

Continued on the following page.





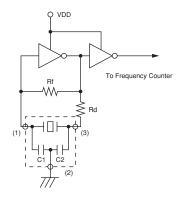


Part Number	Oscillating Frequency (MHz)	Initial Tolerance	Temperature Stability (%)	Temperature Range (°C)
CSTCC_G_A	2.00 to 3.99	±0.5%	±0.4 [-0.6% to +0.3%:Built-in Capacitance 47pF type within Freq.2.00 to 3.49MHz]	-40 to 125
CSTCR_G_B	4.00 to 7.99	±0.5%	±0.15	-40 to 125
CSTCE_G_A	8.00 to 13.99	±0.5%	±0.2	-40 to 125
CSTCE_V_C	14.00 to 20.00	±0.5%	±0.15	-40 to 125
CSACV_X_Q	20.01 to 70.00	±0.5%	±0.3	-40 to 125
CSTCV_X_Q	20.01 to 70.00	±0.5%	±0.3	-40 to 125

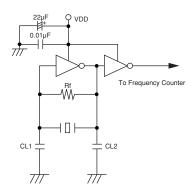
Irregular or stopped oscillation may occur under unmatched circuit conditions. Please check the actual conditions prior to use.

■ Oscillation Frequency Measuring Circuit

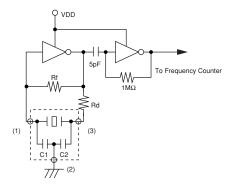
CSTCC_G_A



CSACV_X_Q

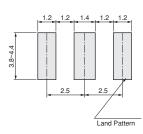


${\tt CSTCE_G_A/CSTCE_V_C/CSTCR_G_B/CSTCV_X_Q}$



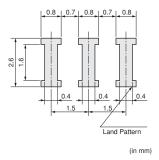
■ Standard Land Pattern Dimensions

CSTCC_G_A

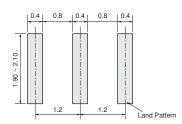


(in mm)

CSTCR_G_B

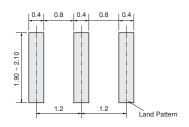


CSTCE_G_A



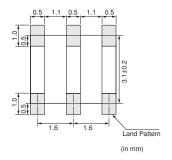
(in mm)

CSTCE_V_C (* This Land Pattern is not common to CSTCE_V.)

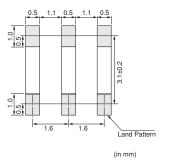


(in mm)

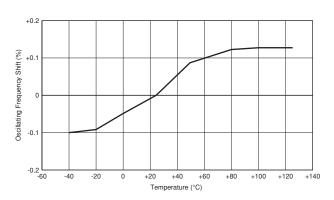
CSTCV_X_Q

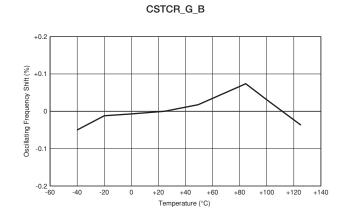


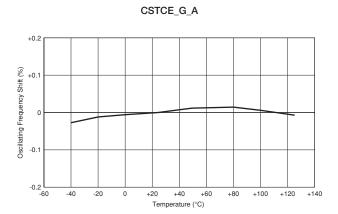
 $\mathsf{CSACV}_\mathsf{X}_\mathsf{Q}$

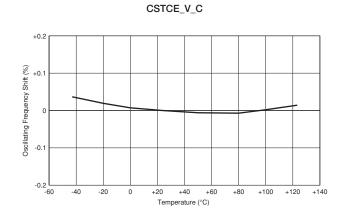


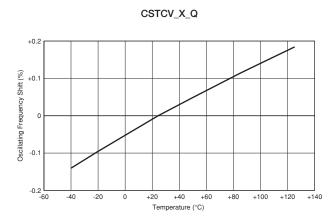
■ Oscillation Frequency Temperature Stability CSTCC_G_A

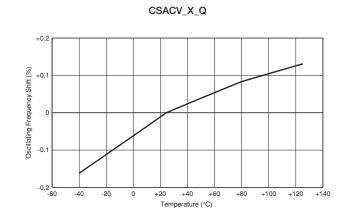








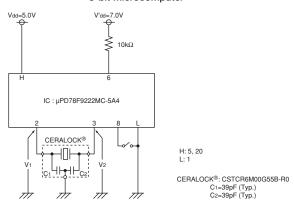




Application Circuits Utilization

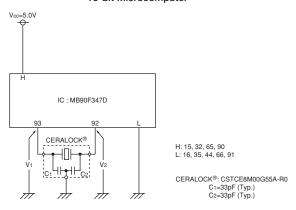
■ µPD78F9222MC-5A4 (Renesas)

8-bit Microcomputer



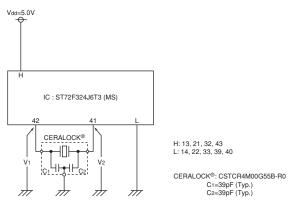
■ MB90F347D (Fujitsu)

16-bit Microcomputer



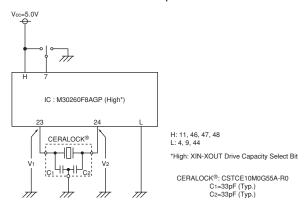
■ ST72F324J6T3 (MS) (ST Microelectronics)

8-bit Microcomputer



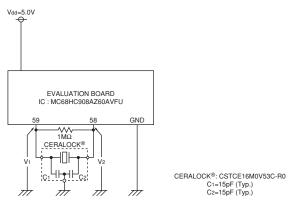
■ M30260F8AGP (Renesas)

16-bit Microcomputer



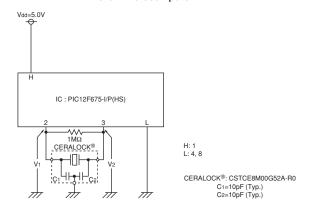
■ MC68HC908AZ60AVFU (Freescale)

8-bit Microcomputer



■ PIC12F675-I/P (HS) (Microchip)

8-bit Microcomputer



■ Soldering and Mounting (CSTCC/CSTCR/CSTCE_V/CSTCE_G Series)

1. Soldering

(1) Reflow soldering

Please mount component on a circuit board by reflow soldering. Flow soldering is not acceptable.

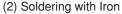
Recommendable Flux and Solder

Flux	Please use rosin based flux, not water soluble flux.
Solder	Please use solder (Sn-3.0Ag-0.5Cu) under the following conditions: Standard thickness of soldering paste: 0.10 to 0.15mm.

Recommendable Soldering Profile

Pre-heating	150 to 180°C	60 to 120s
Heating	220°C min.	30 to 60s
Deal Terrenantura	upper limit: 260°C	1s max.
Peak Temperature	lower limit: 245°C	5s max.

Temperature shall be measured on the surface of component.



If compelled to mount the component by using soldering iron, please do not directly touch the component with the soldering iron. The component terminals or electrical characteristics may be damaged if excessive thermal stress is applied.

Recommendable Soldering with Iron

Heating of the soldering iron	350°C max.
Watt	30W max.
Shape of the soldering iron	ø3mm max.
Soldering Time	5s max. at one terminal
Solder	Sn-3.0Ag-0.5Cu

(3) Solder Volume

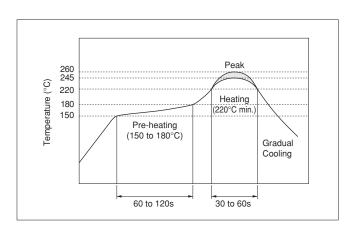
Please make the solder volume less than the height of the substrate to avoid damage to the seal between the metal cap and the substrate.

(4) Other

Do not reuse components removed from a circuit board after soldering.

(5) Conditions for Placement Machines

The component is recommended with placement machines that employ optical placement capabilities. The component may be damaged by excessive mechanical force. Please make sure that you have evaluated by using placement machines before going into mass production. Do not use placement machines that utilize mechanical positioning. Please contact Murata for details beforehand.



Continued on the following page.





Continued from the preceding page.

2. Wash

(1) Cleaning Solvents

HCFC, Isopropanol, Tap water, Demineralized water, Cleanthrough 750H, Pine alpha 100S, Techno care FRW

(2) Temperature Difference : dT *1 dT≦60°C (dT=Component-solvent)

*1 ex. If the component is immersed at +90°C into cleaning solvent at +60°C, then dT=30°C.

(3) Conditions

(a) Ultrasonic Wash

1 minute max. in above solvent at +60°C max. (Frequency: 28kHz, Output: 20W/l)

(4) Drying

5 minutes max. by air blow at +80°C max.

(5) Other

- (a) Total washing time should be within 10 minutes.
- (b) The component may be damaged if it is washed with chlorine, petroleum, or alkali cleaning solvent.

3. Coating

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.

- (b) Immersion Wash
 - 5 minutes max. in above solvent at +60°C max.
- (c) Shower or Rinse Wash

5 minutes max. in above solvent at +60°C max.



■ Soldering and Mounting (CSTCV/CSACV Series)

1. Soldering

(1) Reflow soldering

Please mount component on a circuit board by reflow soldering. Flow soldering is not acceptable.

Recommendable Flux and Solder

Flux	Please use rosin based flux, not water soluble flux.
Solder	Please use solder (Sn-3.0Ag-0.5Cu) under the following conditions: Standard thickness of soldering paste: 0.10 to 0.15mm.

Recommendable Soldering Profile

Pre-heating	150 to 180°C	60 to 120s	
Heating	220°C min. 30 to 60s		
D I. T	upper limit: 260°C	1s max.	
Peak Temperature	lower limit: 245°C	5s max.	

Temperature shall be measured on the surface of component.

(2) Soldering with Iron

If compelled to mount the component by using soldering iron, please do not directly touch the component with the soldering iron. The component terminals or electrical characteristics may be damaged if excessive thermal stress is applied.

Recommendable Soldering with Iron

Heating of the soldering iron	350°C max.
Watt	30W max.
Shape of the soldering iron	ø3mm max.
Soldering Time	5s max. at one terminal
Solder	Sn-3.0Ag-0.5Cu

(3) Other

Do not reuse components removed from a circuit board after soldering.

(4) Conditions for Placement Machines

The component is recommended with placement machines that employ optical placement capabilities. The component may be damaged by excessive mechanical force. Please make sure that you have evaluated by using placement machines before going into mass production. Do not use placement machines that utilize mechanical positioning. Please contact Murata for details beforehand.

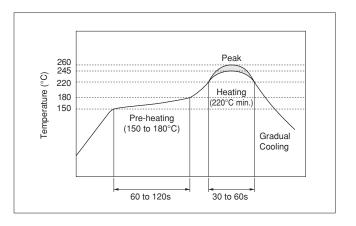
2. Wash

(1) Cleaning Solvents

HCFC, Isopropanol, Tap water, Demineralized water, Cleanthrough750H, Pine alpha 100S, Techno care FRW

(2) Temperature Difference : dT *1 dT≤60°C (dT=Component-solvent)

*1 ex. If the component is immersed at +90°C into cleaning solvent at +60°C, then dT=30°C.



Continued from the preceding page.

- (3) Conditions
 - (a) Ultrasonic Wash

1 minute max. in above solvent at +60°C max. (Frequency: 28kHz, Output: 20W/l)

(4) Drying

5 minutes max. by air blow at +80°C max.

- (5) Other
 - (a) Total washing time should be within 10 minutes.
 - (b) The component may be damaged if it is washed with chlorine, petroleum, or alkali cleaning solvent.
- 3. Coating

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.

(b) Immersion Wash

5 minutes max. in above solvent at +60°C max.

(c) Shower or Rinse Wash

5 minutes max. in above solvent at +60°C max.



■ Storage and Operating Conditions

1. Product Storage Conditions

Please store the products in a room where the temperature/humidity is stable, and avoid such places where there are large temperature changes. Please store the products under the following conditions:

Temperature: -10 to +40°C Humidity: 15 to 85% R.H.

- 2. Expiration Date on Storage
 - Expiration date (Shelf life) of the products is six months after delivery under the conditions of a sealed and unopened package. Please use the products within six months after delivery. If you store the products for a long time (more than six months), use carefully because the products may be degraded in solderability and/or rusty. Please confirm solderability and characteristics for the products regularly.
- 3. Notice on Product Storage
- (1) Please do not store the products in a chemical atmosphere (Acids, Alkali, Bases, Organic gas, Sulfides and so on), because the characteristics may be reduced in quality, and/or be degraded in the solderability due to the storage in a chemical atmosphere.
- Rating

The component may be damaged if excessive mechanical stress is applied.

Handling

"CERALOCK" may stop oscillating or oscillate irregularly under improper circuit conditions.

- (2) Please do not put the products directly on the floor without anything under them to avoid damp and/or dusty places.
- (3) Please do not store the products in places such as: in a damp heated place, in a place where direct sunlight comes in, in a place applying vibrations.
- (4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in the solderability due to storage under the poor conditions.
- (5) Please do not drop the products to avoid cracking of ceramic elements.
- 4. Other

Conformal coating of the component is acceptable. However, the resin material, curing temperature, and other process conditions should be evaluated to confirm that stable electrical characteristics are maintained.

Please be sure to consult with our sales representatives or engineers whenever and prior to using the products.



Packaging for Automotive

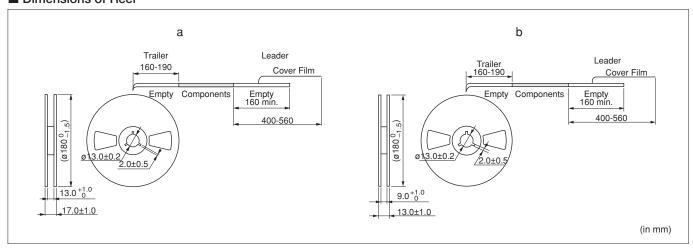
■ Minimum Quantity

Part Number	Plastic Tape ø180mm	Plastic Tape ø330mm	Bulk	Dimensions
CSTCC_G_A	2,000	6,000	500	а
CSTCR_G_B	3,000	9,000	500	а
CSTCR_G15C	3,000	9,000	500	a
CSTCE_G_A	3,000	9,000	500	b
CSTCE_G15C	3,000	9,000	500	b
CSTCE_V_C	3,000	9,000	500	b
CSTCE_V13C	3,000	9,000	500	b
CSTCV_X_Q	2,000	6,000	500	а
CSACV_X_Q	2,000	6,000	500	a

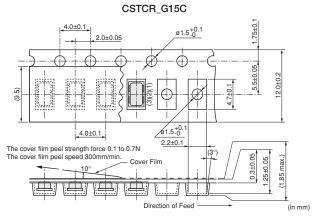
The order quantity should be an integral multiple of the "Minimum Quantity" shown above.

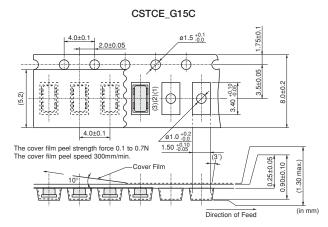
(pcs.)

■ Dimensions of Reel



■ Dimensions of Taping





Continued on the following page.





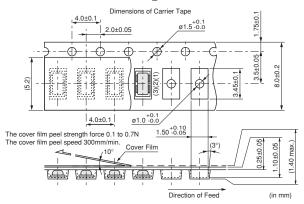
(in mm)

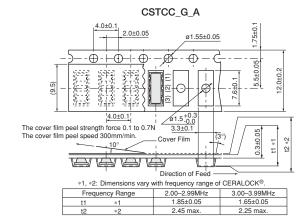
Packaging for Automotive

Continued from the preceding page.

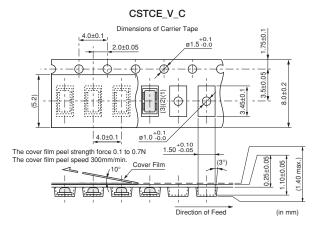
■ Dimensions of Taping

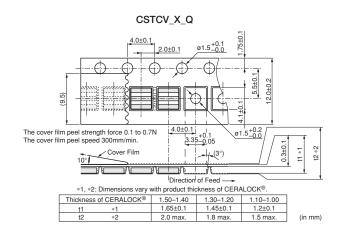
CSTCE_V13C

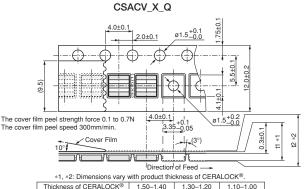




CSTCE_G_A 4.0±0.1 2.0±0.05 0.500







*1, *2: Dimensions vary with product thickness of CEHALOCK®.					
Thickness	of CERALOCK®	1.50-1.40	1.30-1.20	1.10-1.00	
t1	*1	1.65±0.1	1.45±0.1	1.2±0.1	
t2	*2	2.0 max.	1.8 max.	1.5 max.	(in mm)



Ceramic Resonators (CERALOCK®)



MHz Chip Type -Tight Frequency Tolerance for General Usage-

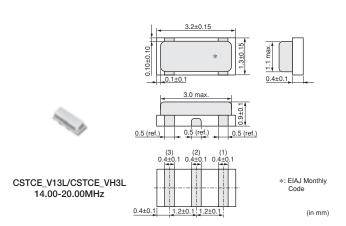
Chip type CERALOCK(R) with built-in load capacitors provides high accuracy in an extremely small package. MURATA's frequency adjustment and packaging technology expertise has enabled the development of the chip CERALOCK(R) with built-in load capacitors. High-density mounting is made possible by the small package and the elimination of the need for an external load capacitor.

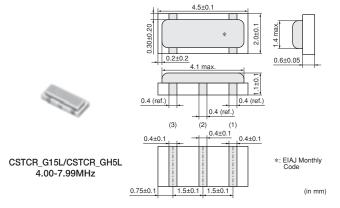
■ Features

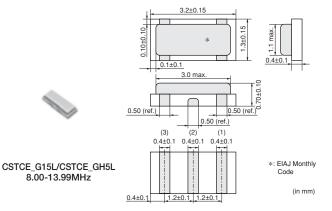
- Oscillation circuits do not require external load capacitors.
- 2. Available in a wide frequency range.
- 3. Extremely small and have a low profile.
- 4. No adjustment is necessary for oscillation circuits.

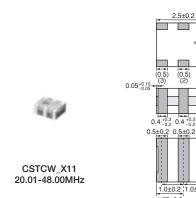
Applications

- Clock oscillators for USB (Full-speed) controller ICs
- 2. Audio equipment and musical instruments, etc.
- 3. Other applications for replacement of Crystal Oscillators









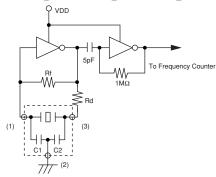
* 0.5 (0.5)	1.4 max.
0.5±0.2 0.5±0.2 0.5±0.2 1.0±0.2 1.0±0.2 1.25±0.2	Thickness varies with frequency and built-in capacitance. *: EIAJ code (in mm)

Part Number	Oscillating Frequency (MHz)	Initial Tolerance	Temperature Stability (%)	Temperature Range (°C)
CSTCR_G15L	4.00 to 7.99	±0.1%	±0.08	0 to 70
CSTCR_GH5L	4.00 to 7.99	±0.07%	±0.08	0 to 70
CSTCE_G15L	8.00 to 13.99	±0.1%	±0.08	0 to 70
CSTCE_GH5L	8.00 to 13.99	±0.07%	±0.08	0 to 70
CSTCE_V13L	14.00 to 20.00	±0.1%	±0.08	0 to 70
CSTCE_VH3L	14.00 to 20.00	±0.07%	±0.08	0 to 70
CSTCW_X11	20.01 to 48.00	±0.1%	±0.1	0 to 70

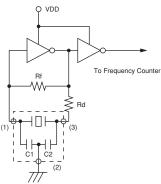
Irregular or stopped oscillation may occur under unmatched circuit conditions. Please check the actual conditions prior to use.

■ Oscillation Frequency Measuring Circuit

CSTCR_G15L/CSTCR_GH5L/CSTCE_G15L/ CSTCE_GH5L/CSTCE_V13L/CSTCE_VH3L

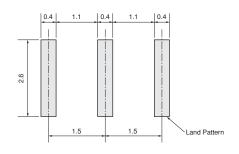


CSTCW_X11

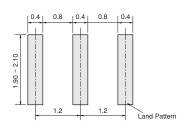


■ Standard Land Pattern Dimensions

CSTCR_G15L/CSTCR_GH5L (* This Land Pattern is not common to CSTCR_G.)

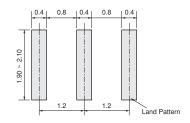


CSTCE_G15L/CSTCE_GH5L

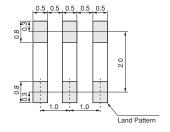


(in mm)

CSTCE_V13L/CSTCE_VH3L (* This Land Pattern is not common to CSTCE_V.)



CSTCW_X11

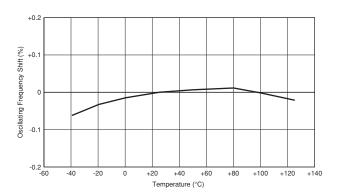


(in mm)

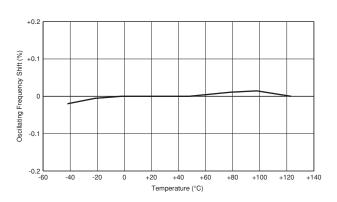
(in mm)



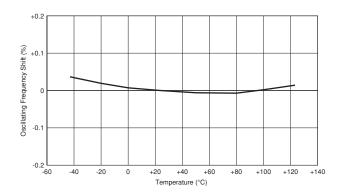
■ Oscillation Frequency Temperature Stability CSTCR_G15L/CSTCR_GH5L



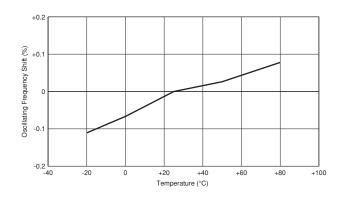
CSTCE_G15L/CSTCE_GH5L



CSTCE_V13L/CSTCE_VH3L



CSTCW_X11

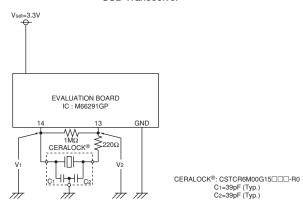




Application Circuits Utilization

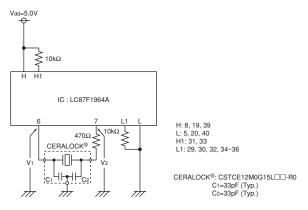
■ M66291GP (Renesas)

USB Transceiver



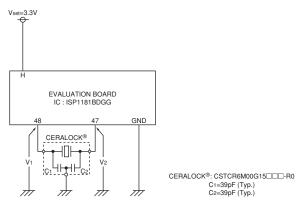
■ LC87F1964A (Sanyo)

8-bit Microcontroller



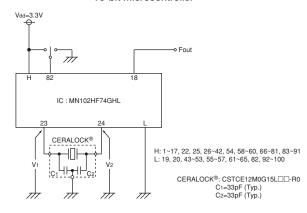
■ ISP1181BDGG (Philips)

USB Controller



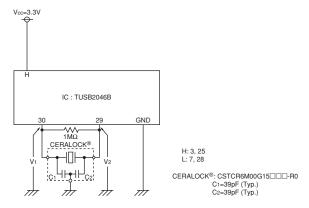
■ MN102HF74GHL (Panasonic)

16-bit Microcontroller



■ TUSB2046B (Texas Instruments)

USB 4-port HUB



Ceramic Resonators (CERALOCK®)



MHz Chip Type -Standard Frequency Tolerance for General Usage-

Chip type CERALOCK(R) with built-in load capacitors provides an extremely small package.

MURATA's package technology expertise has enabled the development of the Chip CERALOCK(R) with built-in load capacitors.

High-density mounting can be realized because of the small package and the elimination of the need for an external load capacitor.

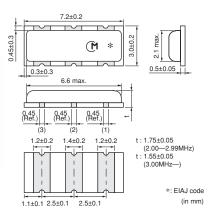
Features

- 1. Oscillation circuits do not require external load capacitors.
- 2. Available in a wide frequency range.
- 3. Extremely small and have a low profile.
- 4. No adjustment is necessary for oscillation circuits.

Applications

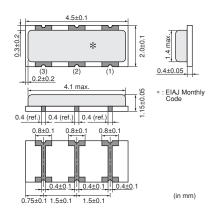
- 1. Clock oscillators for microprocessors
- 2. Small electronic equipment such as handheld phone, digital video camcorder (DVC), digital still camera (DSC), portable audio player, etc.
- 3. Storage media and memory (HDD, Optical storage device, FDD, Flash memory card, etc.)
- 4. Office automation equipment (Mobile PC, Mouse, Keyboard, etc.)
- 5. Audio-visual applications (TV, DVD-HDD recorder, Audio equipment, Remote control, etc.)
- 6. Home appliances (Air conditioner, Microwave oven, Refrigerator, Washing machine, etc.)





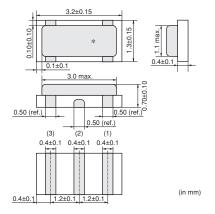


4.00-7.99MHz



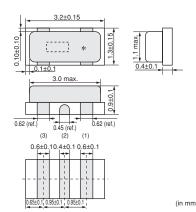


CSTCE G/CSTCE G Z 8.00-13.99MHz



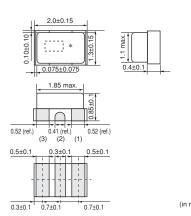


CSTCE_V 14.00-20.00MHz





CSTCG_V 20.00-33.86MHz (Ultra Small)



Continued on the following page.



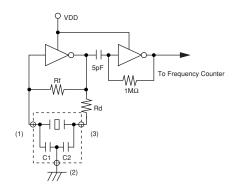


Part Number	Oscillating Frequency (MHz)	Initial Tolerance	Temperature Stability (%)	Temperature Range (°C)
CSTCC_G	2.00 to 3.99	±0.5%	±0.3 [±0.4%:Built-in Capacitance 47pF type within Freq.2.00 to 3.49MHz]	-20 to 80
CSTCR_G	4.00 to 7.99	±0.5%	±0.2	-20 to 80
CSTCE_G	8.00 to 13.99	±0.5%	±0.2	-20 to 80
CSTCE_G_Z	8.00 to 13.99	±0.5%	±0.2	-40 to 125
CSTCE_V	14.00 to 20.00	±0.5%	±0.3	-20 to 80
CSTCG_V	20.00 to 33.86	±0.5%	±0.3	-20 to 80
CSACW_X	20.01 to 70.00	±0.5%	±0.2	-20 to 80
CSTCW_X	20.01 to 70.00	±0.5%	±0.2	-20 to 80

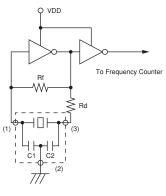
Irregular or stopped oscillation may occur under unmatched circuit conditions. Please check the actual conditions prior to use.

■ Oscillation Frequency Measuring Circuit

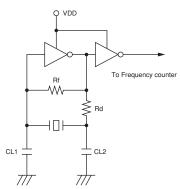
CSTCR_G/CSTCE_G/CSTCE_G_Z/CSTCE_V/CSTCG_V



CSTCC_G/CSTCW_X

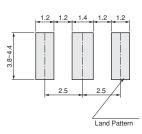


CSACW_X



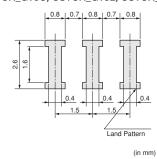
■ Standard Land Pattern Dimensions

CSTCC G

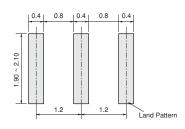


(in mm)

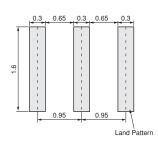
CSTCR_G (* This Land Pattern is not common to CSTCR_G15C, CSTCR_G15L, CSTCR_GH5L.)



CSTCE_G/CSTCE_G_Z



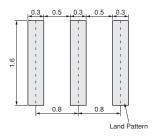
CSTCE_V
(* This Land Pattern is not common to
CSTCE_V13C, CSTCE_V_C, CSTCE_V13L, CSTCE_VH3L.)



(in mm)

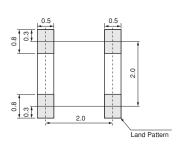
(in mm)

 $CSTCG_V$



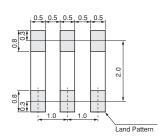
(in mm)

 $\mathsf{CSACW}_{-}\mathsf{X}$

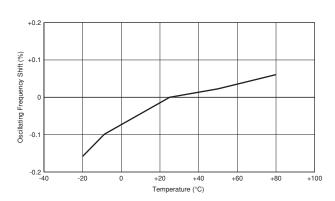


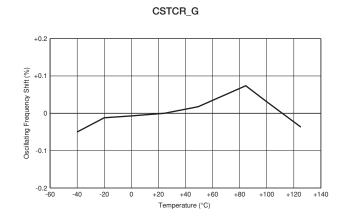
(in mm)

CSTCW_X

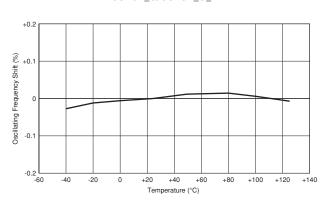


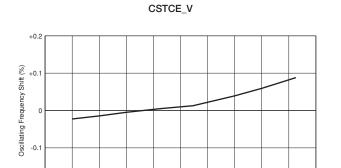
■ Oscillation Frequency Temperature Stability CSTCC_G











+40

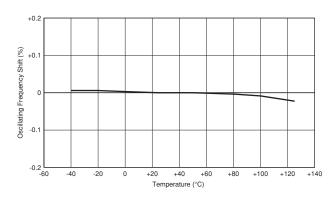
+60

+80

+100

+120

CSTCG_V

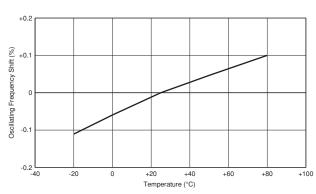




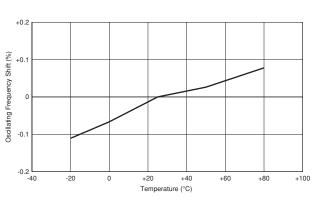
-0.2 L -60

-40

-20



CSTCW_X

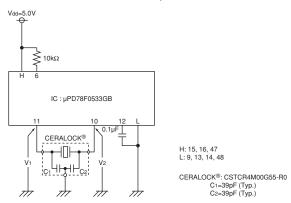




Application Circuits Utilization

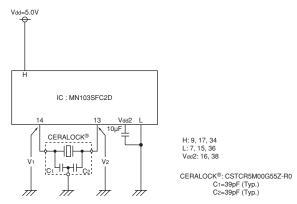
■ µPD78F0533GB (Renesas)

8-bit Microcomputer



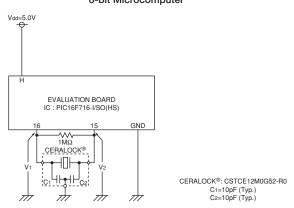
■ MN103SFC2D (Panasonic)

32-bit Microcomputer



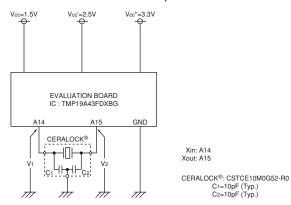
■ PIC16F716-I/SO (Microchip)

8-bit Microcomputer



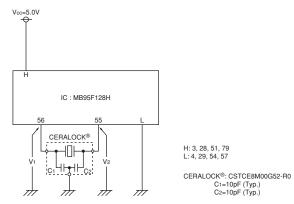
■ TMP19A43FDXBG (Toshiba)

32-bit Microcomputer



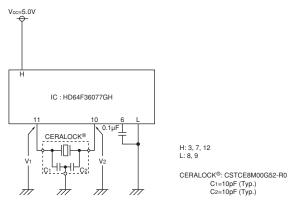
■ MB95F128H (Fujitsu)

8-bit Microcomputer



■ HD64F36077GH (Renesas)

16-bit Microcomputer



Continued on the following page.



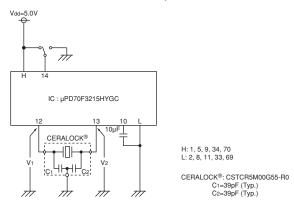


Application Circuits Utilization

Continued from the preceding page.

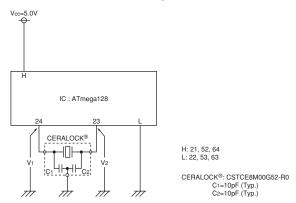
■ µPD70F3215HYGC (Renesas)

32-bit Microcomputer



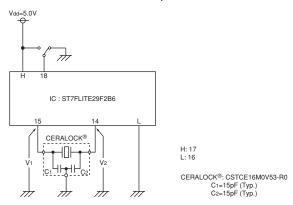
■ ATmega128 (Atmel)

8-bit Microcomputer



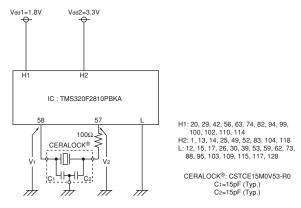
■ ST7FLITE29F2B6 (ST Microelectronics)

8-bit Microcomputer



■ TMS320F2810PBKA (Texas Instruments)

32-bit Microcomputer



Ceramic Resonators (CERALOCK®)



MHz Lead Type -Standard Frequency Tolerance for General Usage-

MURATA's ceramic resonator, CERALOCK(R) with built-in load capacitors, has been widely applied as the most suitable component for clock oscillators in a broad range of microprocessors.

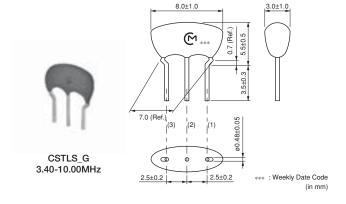
The CSTLS series can be used in the design of oscillation circuits not requiring external load capacitors, enabling both high-density mounting and cost reduction.

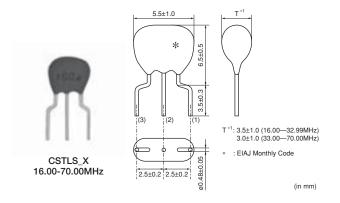
■ Features

- Oscillation circuits do not require external load capacitors.
 - There is some variation in built-in capacitance values applicable to various ICs.
- 2. Stable over a wide temperature range.
- 3. Compact, lightweight and exhibit superior shock resistance performance.
- 4. Enable the design of oscillator circuits requiring no adjustment.
- 5. Cost-effective and reliable availability

Applications

- 1. DTMF generators
- 2. Clock oscillators for microcomputers
- 3. Remote control units
- 4. Automated office equipment



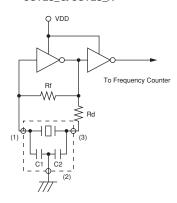


Part Number	Oscillating Frequency (MHz)	Initial Tolerance	Temperature Stability (%)	Temperature Range (°C)
CSTLS_G	3.40 to 10.00	±0.5%	±0.2 [-0.4% to +0.2%:Built-in Capacitance 47pF type]	-20 to 80
CSTLS_X	16.00 to 70.00	±0.5%	±0.2	-20 to 80

Irregular or stopped oscillation may occur under unmatched circuit conditions. Please check the actual conditions prior to use.

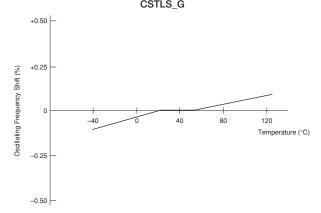
The order quantity should be an integral multiple of the "Minimum Quantity" shown in the packaging page.

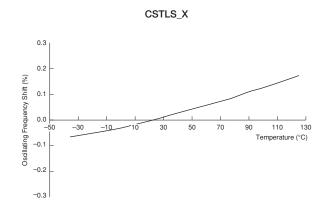
■ Oscillation Frequency Measuring Circuit CSTLS G/CSTLS X





■ Oscillation Frequency Temperature Stability CSTLS_G

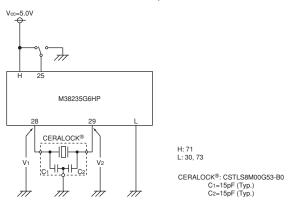




Application Circuits Utilization

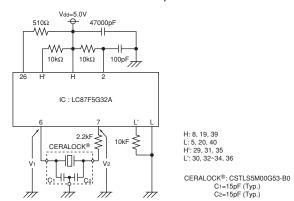
■ M38235G6HP (Renesas)

8-bit Microcomputer



■ LC87F5G32A (Sanyo)

8-bit Microcomputer





■ Soldering and Mounting (CSTCC Series)

1. Soldering

(1) Reflow soldering

Please mount component on a circuit board by reflow soldering. Flow soldering is not acceptable.

Recommendable Flux and Solder

Flux	Please use rosin based flux, not water soluble flux.
Solder	Please use solder (Sn-3.0Ag-0.5Cu) under the following conditions: Standard thickness of soldering paste: 0.10 to 0.15mm.

Recommendable Soldering Profile

Pre-heating	150 to 180°C	60 to 120s
Heating	220°C min.	30 to 60s
De als Taman anatoma	upper limit: 260°C	1s max.
Peak Temperature	lower limit: 245°C	5s max.

Temperature shall be measured on the surface of component.

(2) Soldering with Iron

If compelled to mount the component by using soldering iron, please do not directly touch the component with the soldering iron. The component terminals or electrical characteristics may be damaged if excessive thermal stress is applied.

Recommendable Soldering with Iron

Heating of the soldering iron	350°C max.	
Watt	30W max.	
Shape of the soldering iron	ø3mm max.	
Soldering Time	5s max. at one terminal	
Solder	Sn-3.0Ag-0.5Cu	

(3) Solder Volume

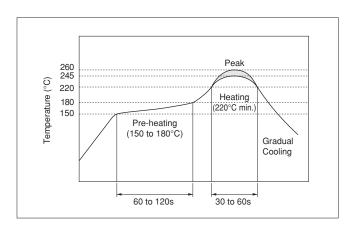
Please make the solder volume less than the height of the substrate to avoid damage to the seal between the metal cap and the substrate.

(4) Other

Do not reuse components removed from a circuit board after soldering.

(5) Conditions for Placement Machines

The component is recommended with placement machines that employ optical placement capabilities. The component may be damaged by excessive mechanical force. Please make sure that you have evaluated by using placement machines before going into mass production. Do not use placement machines that utilize mechanical positioning. Please contact Murata for details beforehand.



Continued on the following page.





Continued from the preceding page.

2. Wash

Some series do not withstand washing. Please check the list at right before use.

(1) Cleaning Solvents

HCFC, Isopropanol, Tap water, Demineralized water, Cleanthrough 750H, Pine alpha 100S, Techno care FRW

(2) Temperature Difference : dT *1 dT≦60°C (dT=Component-solvent)

*1 ex. If the component is immersed at +90°C into cleaning solvent at +60°C, then dT=30°C.

(3) Conditions

(a) Ultrasonic Wash

1 minute max. in above solvent at +60°C max. (Frequency: 28kHz, Output: 20W/l)

(4) Drying

5 minutes max. by air blowing at +80°C max.

(5) Other

- (a) Total washing time should be within 10 minutes.
- (b) The component may be damaged if it is washed with chlorine, petroleum, or alkali cleaning solvent.

3. Coating

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.

Series Wash CSTCC (2.00 to 3.49MHz) Not Available CSTCC (3.50 to 3.99MHz) Available

- (b) Immersion Wash
 - 5 minutes max. in above solvent at +60°C max.
- (c) Shower or Rinse Wash 5 minutes max. in above solvent at +60°C max.



■ Soldering and Mounting (CSTCR/CSTCE_V/CSTCG/CSTCE_G Series)

1. Soldering

(1) Reflow soldering

Please mount component on a circuit board by reflow soldering. Flow soldering is not acceptable.

Recommendable Flux and Solder

Flux	Please use rosin based flux, not water soluble flux.	
Solder	Please use solder (Sn-3.0Ag-0.5Cu) under the following conditions: Standard thickness of soldering paste: 0.10 to 0.15mm.	

Recommendable Soldering Profile

Pre-heating	150 to 180°C	60 to 120s
Heating	220°C min.	30 to 60s
De als Taman anatoma	upper limit: 260°C	1s max.
Peak Temperature	lower limit: 245°C	5s max.

Temperature shall be measured on the surface of component.



If compelled to mount the component by using soldering iron, please do not directly touch the component with the soldering iron. The component terminals or electrical characteristics may be damaged if excessive thermal stress is applied.

Recommendable Soldering with Iron

Heating of the soldering iron	350°C max.
Watt	30W max.
Shape of the soldering iron	ø3mm max.
Soldering Time	5s max. at one terminal
Solder	Sn-3.0Ag-0.5Cu

(3) Solder Volume

Please make the solder volume less than the height of the substrate to avoid damage to the seal between the metal cap and the substrate.

(4) Other

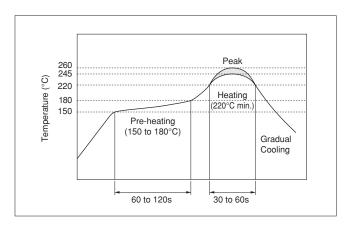
Do not reuse components removed from a circuit board after soldering.

(5) Conditions for Placement Machines

The component is recommended with placement machines that employ optical placement capabilities. The component may be damaged by excessive mechanical force. Please make sure that you have evaluated by using placement machines before going into mass production. Do not use placement machines that utilize mechanical positioning. Please contact Murata for details beforehand.

2. Washing / Coating

Conformal coating or washing of the component is not acceptable, because it is not hermetically sealed. Please contact us if you need a washable component.





Continued from the preceding page.

■ Soldering and Mounting (CSACW/CSTCW Series)

1. Soldering

(1) Reflow soldering

Please mount component on a circuit board by reflow soldering. Flow soldering is not acceptable.

Recommendable Flux and Solder

Flux	Please use rosin based flux, not water soluble flux.	
Solder	Please use solder (Sn-3.0Ag-0.5Cu) under the following conditions: Standard thickness of soldering paste: 0.10 to 0.15mm.	

Recommendable Soldering Profile

Pre-heating	150 to 180°C	60 to 120s
Heating	220°C min.	30 to 60s
Dools Townsonshive	upper limit: 260°C	1s max.
Peak Temperature	lower limit: 245°C	5s max.

Temperature shall be measured on the surface of component.



If compelled to mount the component by using soldering iron, please do not directly touch the component with the soldering iron. The component terminals or electrical characteristics may be damaged if excessive thermal stress is applied.

Recommendable Soldering with Iron

Heating of the soldering iron	350°C max.
Watt	30W max.
Shape of the soldering iron	ø3mm max.
Soldering Time	5s max. at one terminal
Solder	Sn-3.0Ag-0.5Cu

(3) Other

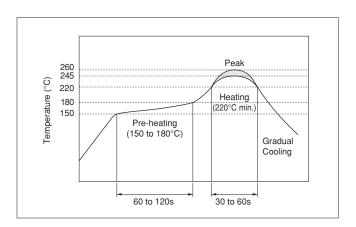
Do not reuse components removed from a circuit board after soldering.

(4) Conditions for Placement Machines

The component is recommended with placement machines that employ optical placement capabilities. The component may be damaged by excessive mechanical force. Please make sure that you have evaluated by using placement machines before going into mass production. Do not use placement machines that utilize mechanical positioning. Please contact Murata for details beforehand.

2. Washing / Coating

Conformal coating or washing of the component is not acceptable, because it is not hermetically sealed. Please contact us if you need a washable component.



■ Storage and Operating Conditions

Product Storage Conditions
 Please store the products in a room where the temperature/humidity is stable, and avoid such places where there are large temperature changes. Please store the products under the following conditions:

Temperature: -10 to +40°C Humidity: 15 to 85% R.H.

- 2. Expiration Date on Storage
 - Expiration date (Shelf life) of the products is six months after delivery under the conditions of a sealed and unopened package. Please use the products within six months after delivery. If you store the products for a long time (more than six months), use carefully because the products may be degraded in solderability and/or rusty. Please confirm solderability and characteristics for the products regularly.
- 3. Notice on Product Storage
 - (1) Please do not store the products in a chemical atmosphere (Acids, Alkali, Bases, Organic gas, Sulfides and so on), because the characteristics may be reduced in quality, and/or be degraded in the solderability due to the storage in a chemical atmosphere.
- Rating

The component may be damaged if excessive mechanical stress is applied.

Handling

"CERALOCK" may stop oscillating or oscillate irregularly under improper circuit conditions.

- (2) Please do not put the products directly on the floor without anything under them to avoid damp and/or dusty places.
- (3) Please do not store the products in places such as: in a damp heated place, in a place where direct sunlight comes in, in a place applying vibrations.
- (4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in the solderability due to storage under the poor conditions.
- (5) Please do not drop the products to avoid cracking of ceramic elements.
- 4. Other

Conformal coating or washing of the component is not acceptable because it is not hermetically sealed. Please be sure to consult with our sales representatives or engineers whenever and prior to using the products.



Notice for General Usage -MHz Lead Type-

■ Soldering and Mounting

The component cannot withstand washing.

Please do not apply excessive mechanical stress to the component and lead terminals during soldering.

■ Storage and Operating Conditions

Product Storage Conditions
 Please store the products in a room where the temperature/humidity is stable, and avoid such places where there are large temperature changes. Please store the products under the following conditions:

Temperature: -10 to +40°C Humidity: 15 to 85% R.H.

- 2. Expiration Date on Storage
 - Expiration date (Shelf life) of the products is six months after delivery under the conditions of a sealed and unopened package. Please use the products within six months after delivery. If you store the products for a long time (more than six months), use carefully because the products may be degraded in solderability and/or rusty. Please confirm solderability and characteristics for the products regularly.
- 3. Notice on Product Storage
 - (1) Please do not store the products in a chemical atmosphere (Acids, Alkali, Bases, Organic gas, Sulfides and so on), because the characteristics may be reduced in quality, and/or be degraded in the solderability due to the storage in a chemical atmosphere.
- Rating

The component may be damaged if excessive mechanical stress is applied.

Handling

"CERALOCK" may stop oscillating or oscillate irregularly under improper circuit conditions.

- (2) Please do not put the products directly on the floor without anything under them to avoid damp and/or dusty places.
- (3) Please do not store the products in places such as: in a damp heated place, in a place where direct sunlight comes in, in a place applying vibrations.
- (4) Please use the products immediately after the package is opened, because the characteristics may be reduced in quality, and/or be degraded in the solderability due to storage under the poor conditions.
- (5) Please do not drop the products to avoid cracking of ceramic elements.
- 4. Other

Conformal coating or washing of the component is not acceptable because it is not hermetically sealed.

Please be sure to consult with our sales representatives or engineers whenever and prior to using the products.



Packaging for General Usage -MHz Chip Type-

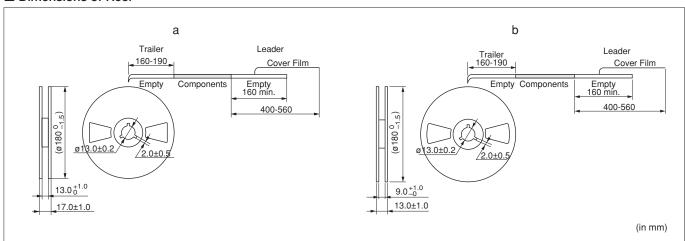
■ Minimum Quantity

Part Number	Plastic Tape ø180mm	Plastic Tape ø330mm	Bulk	Dimensions
CSTCC_G	2,000	6,000	500	a
CSTCR_G	3,000	9,000	500	a
CSTCR_G15L	3,000	9,000	500	a
CSTCR_GH5L	3,000	9,000	500	b
CSTCE_G	3,000	9,000	500	b
CSTCE_G15L	3,000	9,000	500	b
CSTCE_GH5L	3,000	9,000	500	b
CSTCE_V	3,000	9,000	500	b
CSTCE_V13L	3,000	9,000	500	b
CSTCE_VH3L	3,000	9,000	500	b
CSTCG_V	3,000	9,000	500	b
CSTCW_X	3,000	9,000	500	b
CSTCW_X11	3,000	9,000	500	b
CSACW_X	3,000	9,000	500	b

The order quantity should be an integral multiple of the "Minimum Quantity" shown above.

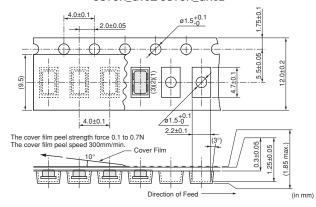
(pcs.)

Dimensions of Reel

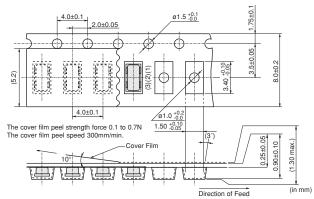


■ Dimensions of Taping

CSTCR_G15L/CSTCR_GH5L



CSTCE_G15L/CSTCE_GH5L



Continued on the following page.



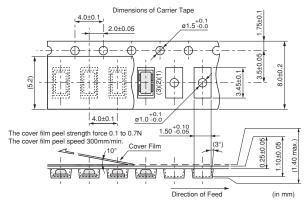


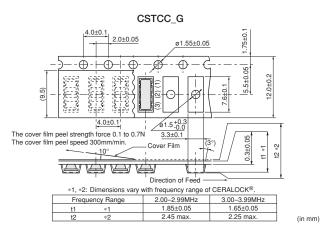
Packaging for General Usage -MHz Chip Type-

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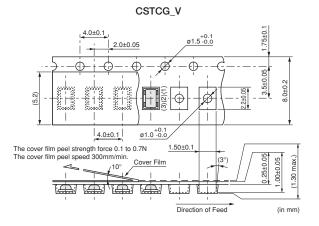
■ Dimensions of Taping

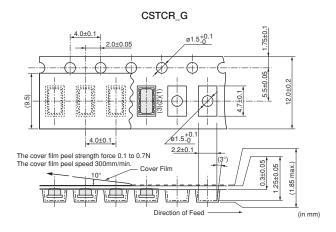
CSTCE_V13L/CSTCE_VH3L

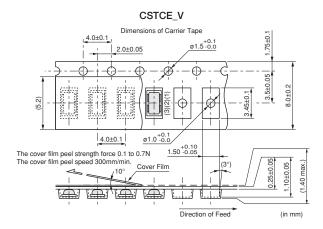


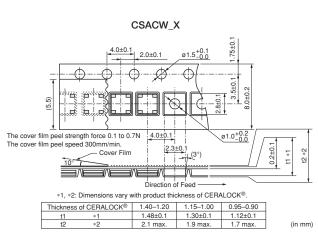


CSTCE_G #4.0±0.1 2.0±0.05 #1.5 ±0.1 #0.1







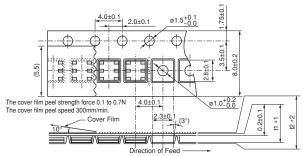


Packaging for General Usage -MHz Chip Type-

Continued from the preceding page.

■ Dimensions of Taping

CSTCW_X



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

Th	ickness 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	2.1 max.	1.9 max.	1.7 max.

Packaging for General Usage -MHz Lead Type-

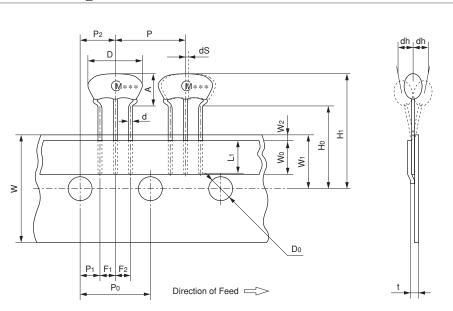
■ Minimum Quantity

Part Number	Ammo Pack	Bulk
CSTLS_G (3.40 to 10.0MHz)	2,000	500
CSTLS_X (16.00 to 70.00MHz)	2,000	500

The order quantity should be an integral multiple of the "Minimum Quantity" shown above.

(pcs.)

■ Tape Dimensions of CSTLS_G



Item	Code	Dimensions	Tolerance	Remarks
Width of diameter	D	8.0	±1.0	
Height of resonator	Α	5.5	±0.5	
Dimensions of terminal	d	ø0.48	±0.05	
Lead length under the hold down tape	L1	5.0 min.	_	
Pitch of component	Р	12.7	±0.5	Tolerance for Pitches 10xP0=127±1
Pitch of sprocket hole	Po	12.7	±0.2	
Length from sprocket hole center to lead	P1	3.85	±0.5	
Length from sprocket hole center to component center	P2	6.35	±0.5	
Lead spacing (I)	F1	2.5	±0.2	
Lead spacing (II)	F2	2.5	±0.2	
Slant forward or backward	dh	0	±1.0	1mm max.
Width of carrier tape	W	18.0	±0.5	
Width of hold down tape	W ₀	6.0 min.	_	Hold down tape does not exceed the carrier tape.
Position of sprocket hole	W1	9.0	±0.5	
Gap of hold down tape and carrier tape	W2	0	+0.5 -0	
Distance between the center of sprocket hole and lead stopper	H ₀	18.0	±0.5	
Total height of resonator	H1	23.5	±1.0	
Diameter of sprocket hole	Do	ø4.0	±0.2	
Total tape thickness	t	0.6	±0.2	
Body tilt	dS	0	±1.0	

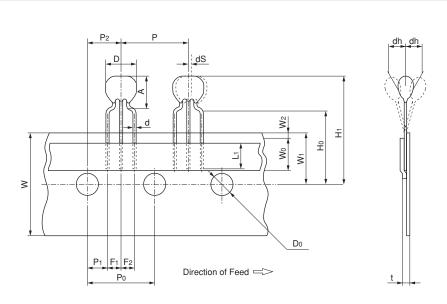




Packaging for General Usage -MHz Lead Type-

Ontinued from the preceding page.

■ Tape Dimensions of CSTLS_X



Item	Code	Dimensions	Tolerance	Remarks
Width of diameter	D	5.5	±1.0	
Height of resonator	Α	6.5	±0.5	
Dimensions of terminal	d	ø0.48	±0.05	
Lead length under the hold down tape	L1	5.0 min.	_	
Pitch of component	Р	12.7	±0.5	Tolerance for Pitches 10xP0=127±1
Pitch of sprocket hole	Po	12.7	±0.2	
Length from sprocket hole center to lead	P1	3.85	±0.5	
Length from sprocket hole center to component center	P2	6.35	±0.5	
Lead spacing (I)	F1	2.5	±0.2	
Lead spacing (II)	F2	2.5	±0.2	
Slant forward or backward	dh	0	±1.0	1mm max.
Width of carrier tape	W	18.0	±0.5	
Width of hold down tape	W ₀	6.0 min.	_	Hold down tape does not exceed the carrier tape.
Position of sprocket hole	W1	9.0	±0.5	
Gap of hold down tape and carrier tape	W2	0	+0.5 -0.0	
Distance between the center of sprocket hole and lead stopper	H ₀	18.0	±0.5	
Total height of resonator	H1	24.5	±1.0	
Diameter of sprocket hole	Do	ø4.0	±0.2	
Total tape thickness	t	0.6	±0.2	
Body tilt	dS	0	±1.0	



⚠Note:

Export Control

<For customers outside Japan>

No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

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.

- Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.
 - Aircraft equipment
 Undersea equipment
- ② Aerospace equipment④ Power plant equipment
- Medical equipment
- Transportation equipment (vehicles, trains, ships, etc.)
- Traffic signal equipment
- B Disaster prevention / crime prevention equipment
- Data-processing equipment
- (1) Application of similar complexity and/or reliability requirements to the applications listed above
- 3. Product specifications in this catalog are as of September 2012. 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 ordering. If there are any questions, please contact our sales representatives or product engineers.
- 4. Please read rating and 🛆 CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.
- 5. This catalog has only typical specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.
- 6. 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 a third party's intellectual property rights and other related rights in consideration of your use of 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.
- 7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.



http://www.murata.com/



OOO «ЛайфЭлектроникс" "LifeElectronics" LLC

ИНН 7805602321 КПП 780501001 P/C 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 3010181090000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный) Email: org@lifeelectronics.ru