● Part Numbering

CERALOCK® (MHz)

(Part Number)

CS	T	CE	16M0	V	5	3	***	-R0
❶	❷	❸	❹	❺	❻	❼	❽	❾

❶Product ID

Product ID	
CS	Ceramic Resonators

❷Frequency/Capacitance

Code	Frequency/Capacitance
A	MHz with No Capacitance Built-in
T	MHz with Built-in Capacitance

❸Structure/Size

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

❹Nominal Center Frequency

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

❺Design

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

❻Initial Frequency Tolerance

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

❼Load Capacity

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

❽Individual Specification

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

With standard products, "❽Individual Specification" and "❾Packaging" is omitted.

❾Packaging

Code	Packaging
-B0	Bulk
-A0	Radial Taping H_0=18mm
-R0/*R0	Plastic Taping ø=180mm Reel
-R1	Plastic Taping ø=330mm Reel

• Radial taping is applied to lead type and plastic taping to chip type.
• In case of CSACN and CSACM series, the hyphen "**-**" is replaced to a figure which means frequency rank. This figure zero "**0**" signifies standard part number.

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.

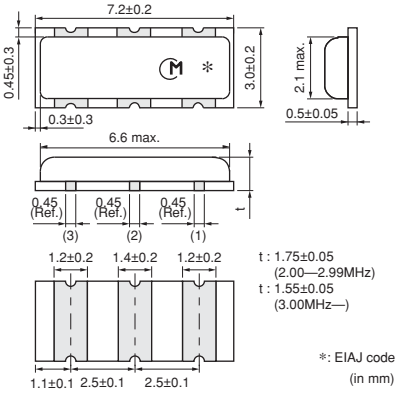
■ Features

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 profile.
5. No adjustment is necessary for oscillation circuits.

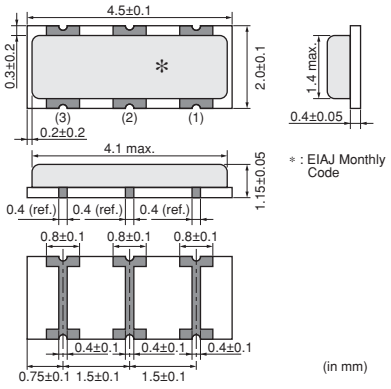
■ Applications

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, etc.
4. Car Air conditioner, Power Window, Remote Keyless Entry system, etc.
5. Electronic Toll Collection system, Car Navigation, etc.

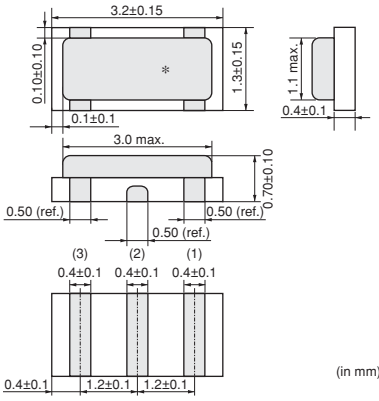
CSTCC_G_A
2.00-3.99MHz



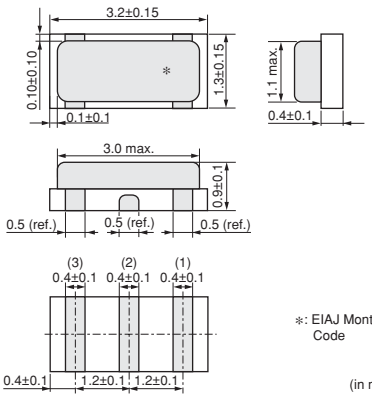
CSTCR_G_B
4.00-7.99MHz



CSTCE_G_A
8.00-13.99MHz



CSTCE_V_C
14.00-20.00MHz



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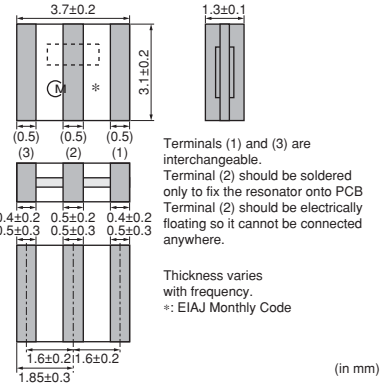
2

CSACV_X_Q
20.01-70.00MHz

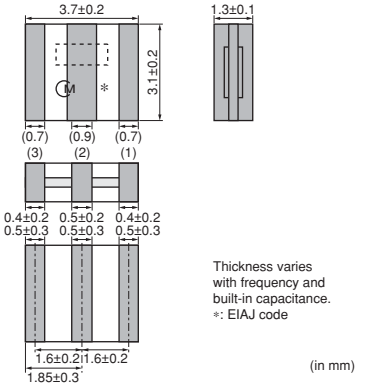


Terminals (1) and (3) are interchangeable.
Terminal (2) should be soldered only to fix the resonator onto PCB
Terminal (2) should be electrically floating so it cannot be connected anywhere.

Thickness varies with frequency.
∗: EIAJ Monthly Code

(in mm)

CSTCV_X_Q
20.01-70.00MHz



Thickness varies with frequency and built-in capacitance.
∗: EIAJ code

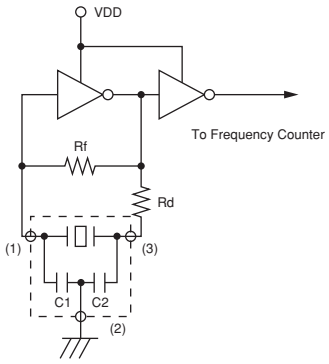
(in mm)

Part Number	Frequency (MHz)	Initial Tolerance	Frequency Shift by Temperature (%)	Operating 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

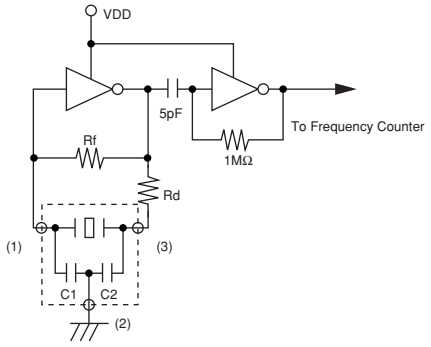
Irregular or stopped oscillation may occur under unmatched circuit conditions. Please check the actual conditions prior to use.

■ Oscillation Frequency Measuring Circuit

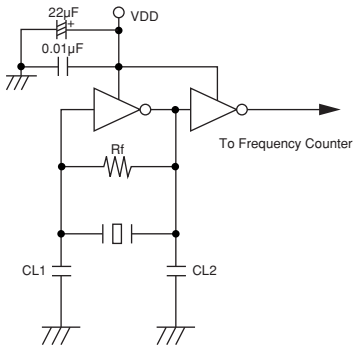
CSTCC_G_A



CSTCE_G_A/CSTCE_V_C/CSTCR_G_B/CSTCV_X_Q

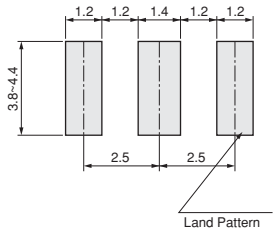


CSACV_X_Q



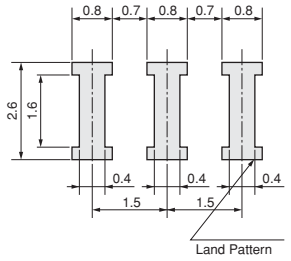
■ Standard Land Pattern Dimensions

CSTCC_G_A



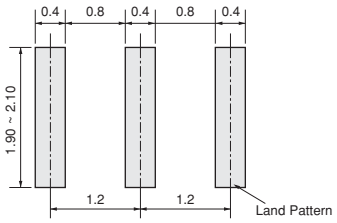
(in mm)

CSTCR_G_B



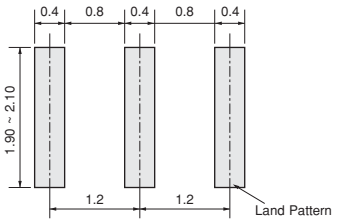
(in mm)

CSTCE_G_A



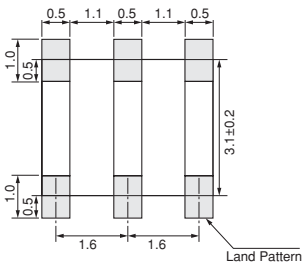
(in mm)

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



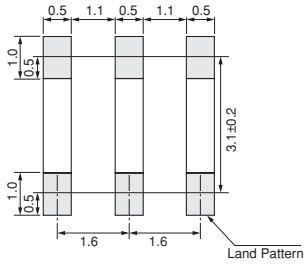
(in mm)

CSTCV_X_Q



(in mm)

CSACV_X_Q

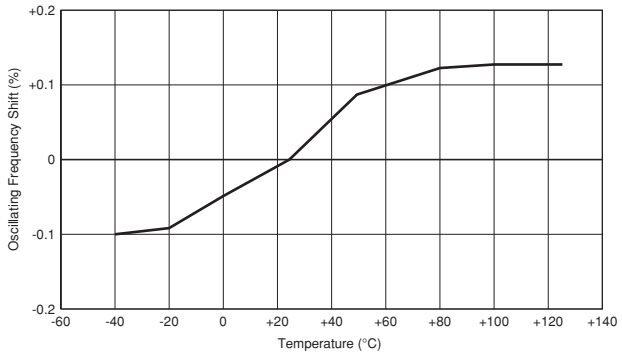


(in mm)

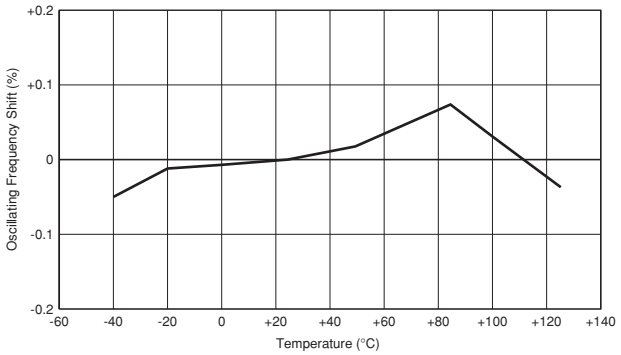
2

■ Frequency Temperature Characteristics

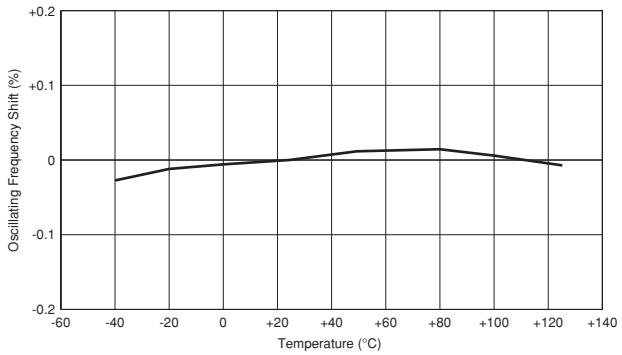
CSTCC_G_A



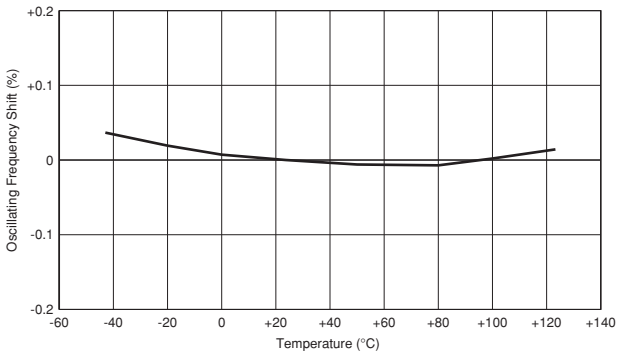
CSTCR_G_B



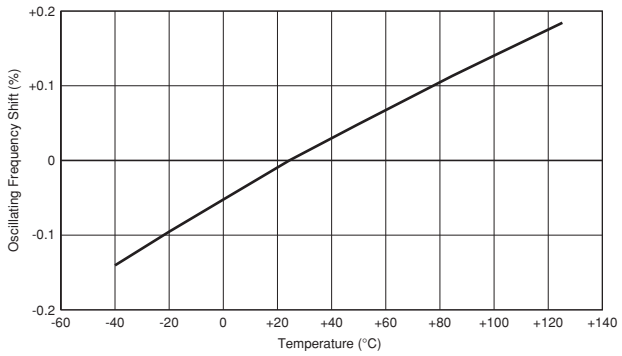
CSTCE_G_A



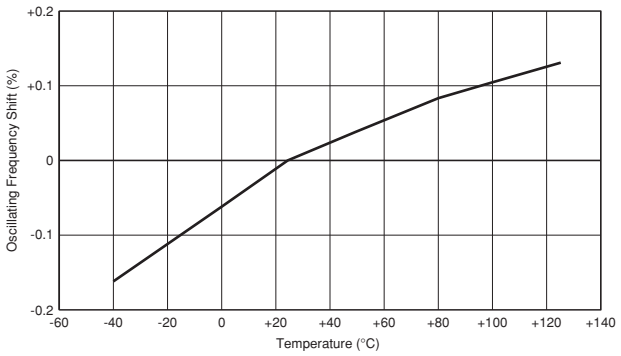
CSTCE_V_C



CSTCV_X_Q



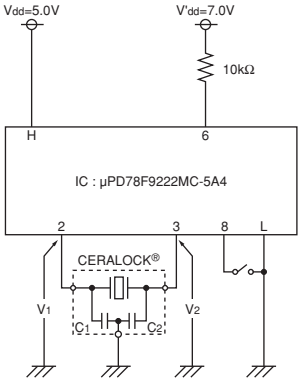
CSACV_X_Q



Application Circuits Utilization

■ µPD78F9222MC-5A4 (Renesas)

8-bit Microcomputer

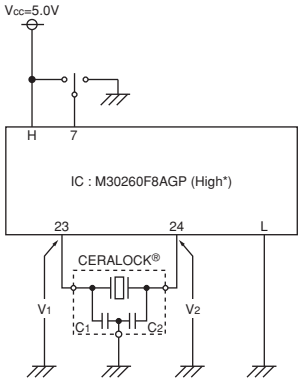


H: 5, 20
L: 1

CERALOCK®: CSTCR6M00G55B-R0
C1=39pF (Typ.)
C2=39pF (Typ.)

■ M30260F8AGP (Renesas)

16-bit Microcomputer



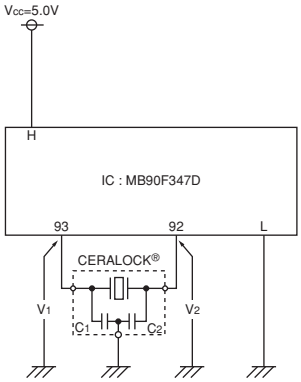
H: 11, 46, 47, 48
L: 4, 9, 44

*High: XIN-XOUT Drive Capacity Select Bit

CERALOCK®: CSTCE10M0G55A-R0
C1=33pF (Typ.)
C2=33pF (Typ.)

■ MB90F347D (Fujitsu)

16-bit Microcomputer

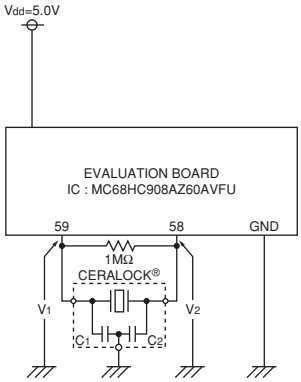


H: 15, 32, 65, 90
L: 16, 35, 44, 66, 91

CERALOCK®: CSTCE8M00G55A-R0
C1=33pF (Typ.)
C2=33pF (Typ.)

■ MC68HC908AZ60AVFU (Freescale)

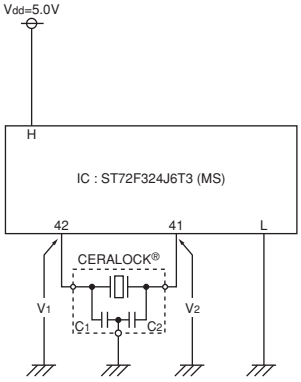
8-bit Microcomputer



CERALOCK®: CSTCE16M0V53C-R0
C1=15pF (Typ.)
C2=15pF (Typ.)

■ ST72F324J6T3 (MS) (ST Microelectronics)

8-bit Microcomputer

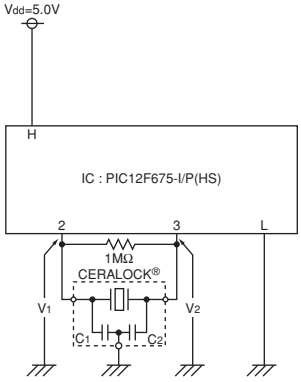


H: 13, 21, 32, 43
L: 14, 22, 33, 39, 40

CERALOCK®: CSTCR4M00G55B-R0
C1=39pF (Typ.)
C2=39pF (Typ.)

■ PIC12F675-I/P (HS) (Microchip)

8-bit Microcomputer



H: 1
L: 4, 8

CERALOCK®: CSTCE8M00G52A-R0
C1=10pF (Typ.)
C2=10pF (Typ.)

Notice for Automotive

■ 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.

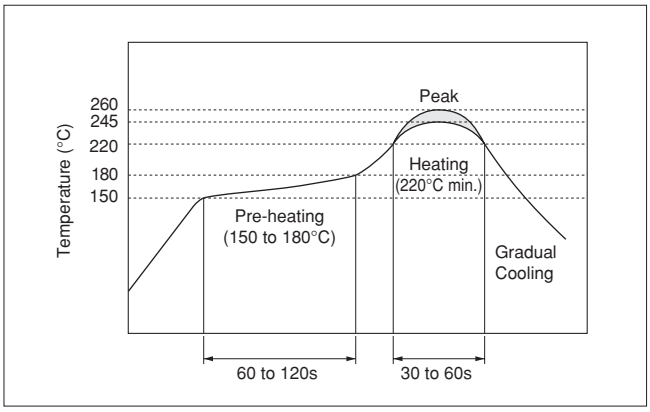
Recommendable Flux and Solder

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
Peak Temperature	upper limit: 260°C	1s max.
	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.

Notice for Automotive

Continued from the preceding page.

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.

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

(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.

Notice for Automotive

■ 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.

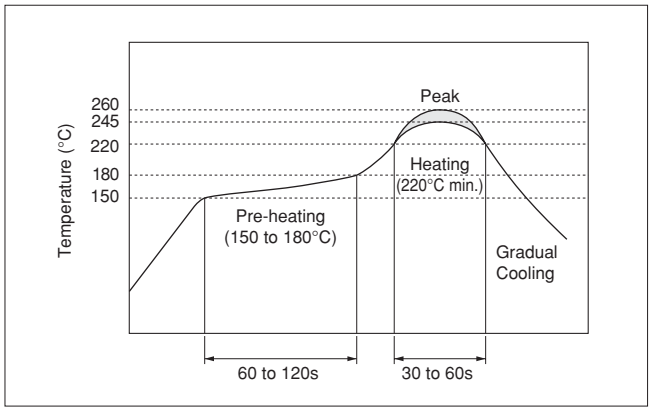
Recommendable Flux and Solder

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
Peak Temperature	upper limit: 260°C	1s max.
	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 on the following page.

Notice for Automotive

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)

(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.

(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.

Notice for Automotive

■ 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.
   (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.

■ Rating

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

■ Handling

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

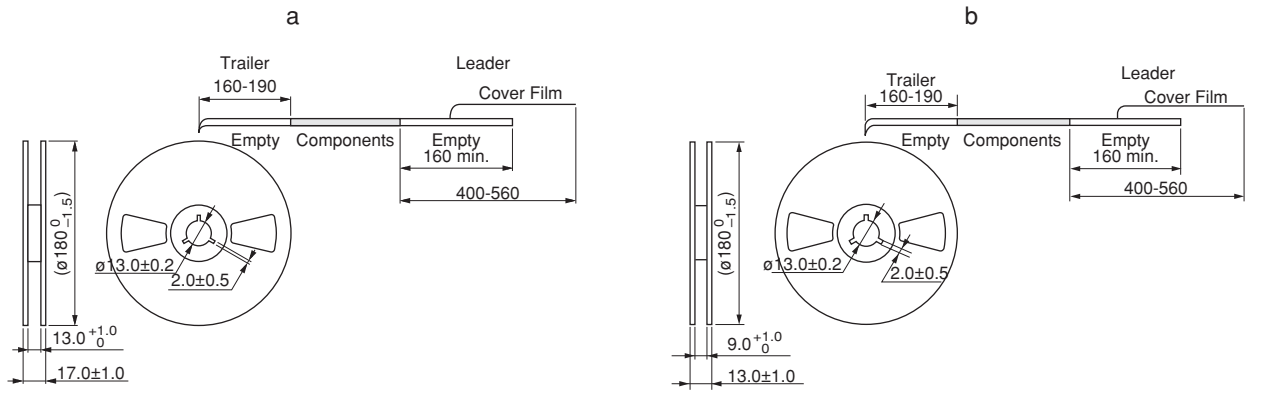
Packaging for Automotive

■ Minimum Quantity

Part Number	Plastic Tape ø180mm	Plastic Tape ø330mm	Bulk	Reel Dimensions
CSTCC_G_A	2,000	6,000	500	a
CSTCR_G_B	3,000	9,000	500	a
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	a
CSACV_X_Q	2,000	6,000	500	a

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

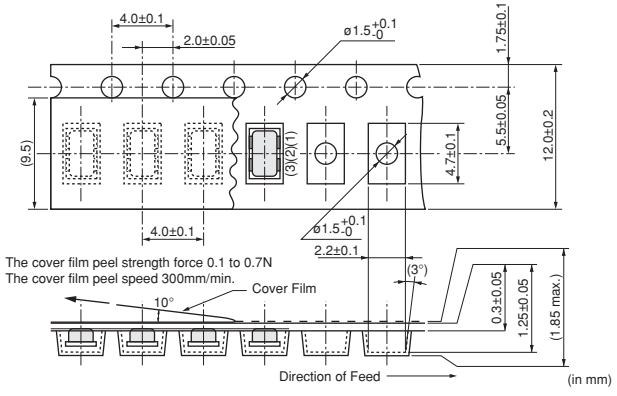
■ Dimensions of Reel



(in mm)

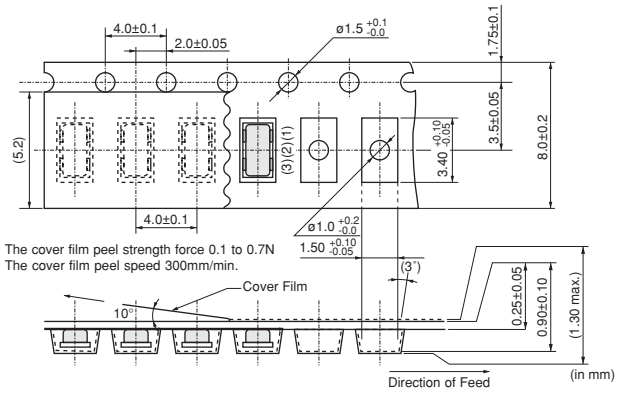
■ Dimensions of Taping

CSTCR_G15C



(in mm)

CSTCE_G15C



(in mm)

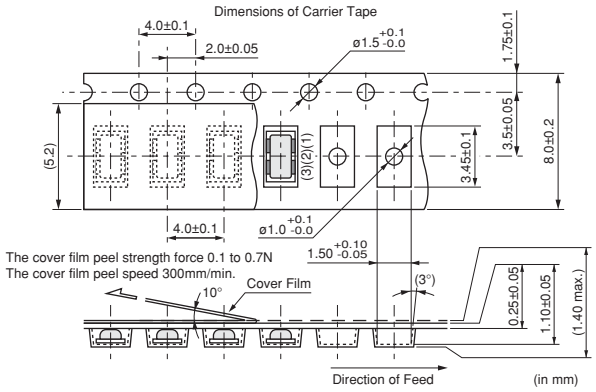
Continued on the following page.

Packaging for Automotive

Continued from the preceding page.

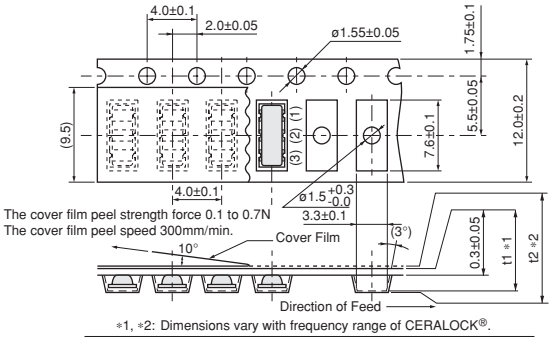
■ Dimensions of Taping

CSTCE_V13C



(in mm)

CSTCC_G_A

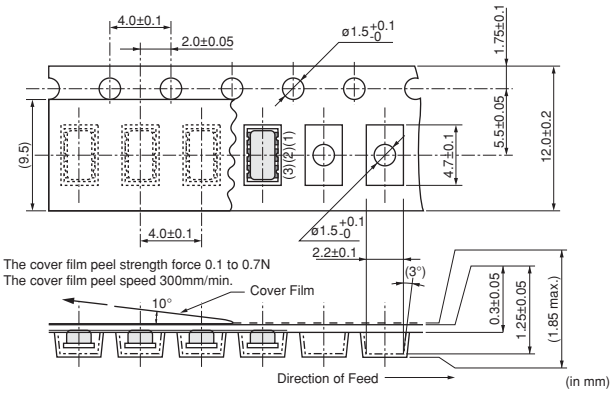


*1, *2: Dimensions vary with frequency range of CERALOCK®.

Frequency Range		2.00–2.99MHz	3.00–3.99MHz
t1	*1	1.85±0.05	1.65±0.05
t2	*2	2.45 max.	2.25 max.

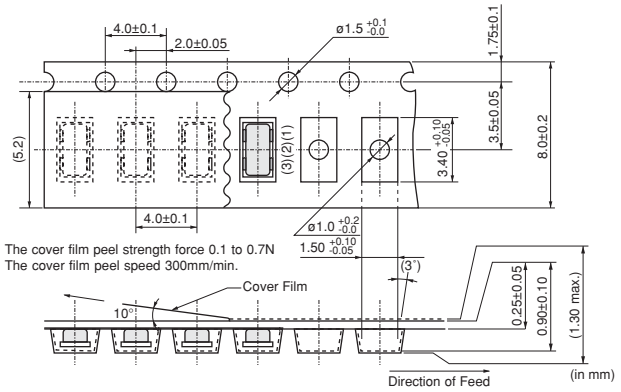
(in mm)

CSTCR_G_B



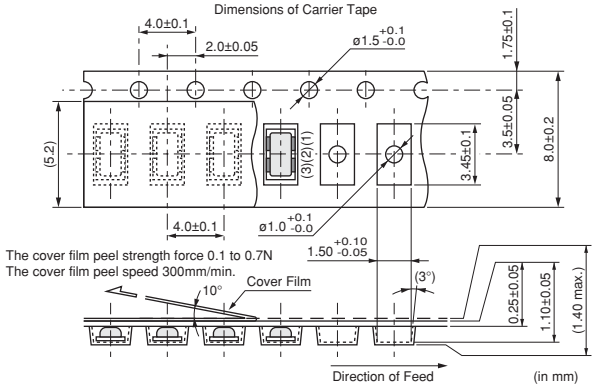
(in mm)

CSTCE_G_A



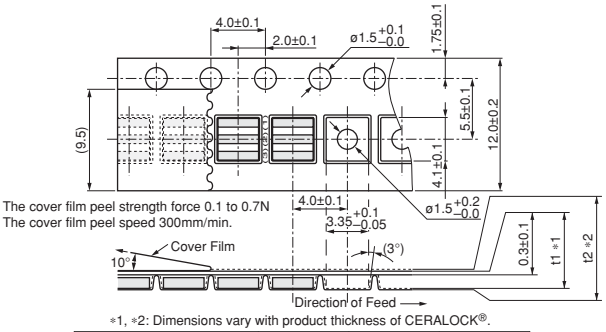
(in mm)

CSTCE_V_C



(in mm)

CSTCV_X_Q

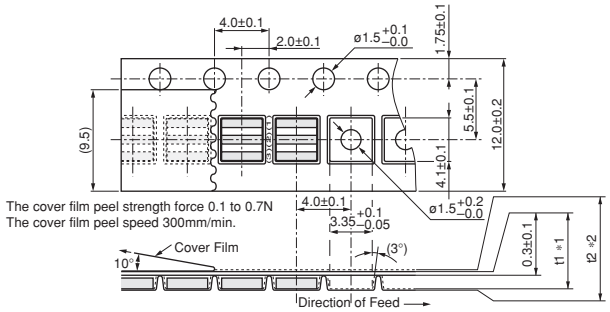


*1, *2: Dimensions vary with product thickness of CERALOCK®.

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)

CSACV_X_Q



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

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)