

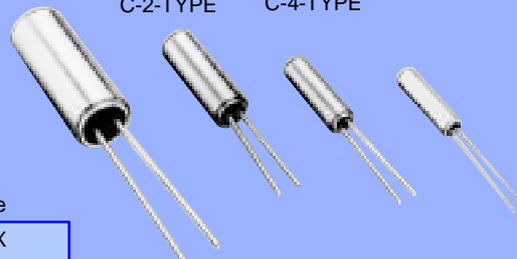
## kHz RANGE CRYSTAL UNIT CYLINDER

# C - TYPE C - 2 - TYPE / C - 4 - TYPE

- Frequency range : 32.768 kHz (20 kHz to 307.2 kHz)
- Thickness :  $\phi 1.2$  mm to  $\phi 3.1$  mm
- Overtone order : Fundamental / Overtone(192 kHz,307.2 kHz)
- Applications : Clock and Microcomputer



C-001R C-002RX C-004R C-005R  
C-2-TYPE C-4-TYPE



Actual size

C-002RX



### Specifications for C-TYPE (characteristics)

Item	Symbol	C-001R	C-002RX	C-004R	C-005R	Remarks
Nominal frequency range	f	32.768 kHz				
Temperature range	T_stg	-20 °C to +70 °C				Store as bare product after unpacking
Storage temperature range	T_use	-10 °C to +60 °C				
Level of drive	DL	1.0 $\mu$ W Max.				
Frequency tolerance (standard)	f_tol	$\pm 20 \times 10^{-6}$				+25 °C, DL=0.1 $\mu$ W
Turnover temperature	Ti	+25 °C $\pm 5$ °C				
Parabolic coefficient	B	$-0.04 \times 10^{-6} / ^\circ\text{C}^2$ Max.				
Load capacitance	CL	6 pF to $\infty$				Please specify
Motional resistance (ESR)	R <sub>1</sub>	35 k $\Omega$ Max. (18 k $\Omega$ Typ.)	50 or 60 k $\Omega$ Max. (30 k $\Omega$ Typ.)	50 k $\Omega$ Max. (30 k $\Omega$ Typ.)	50 k $\Omega$ Max. (37 k $\Omega$ Typ.)	
Motional capacitance	C <sub>1</sub>	2.1 fF Typ.	2.0 fF	2.0 fF	1.9 fF Typ.	
Shunt capacitance	C <sub>0</sub>	0.9 pF Typ.	0.85 pF	0.85 pF	0.75 pF Typ.	
Frequency aging	f_age	$\pm 3 \times 10^{-6} / \text{year}$ Max.				+25 °C, First year

### Specifications for C-2-TYPE C-4-TYPE (characteristics)

Item	Symbol	Specifications		Remarks
		C-2-TYPE	C-4-TYPE	
Nominal frequency range	f	20 kHz to 165 kHz, 307.2 kHz	32 kHz to 120 kHz, 192 kHz	
Temperature range	T_stg	-20 °C to +70 °C		Store as bare product after unpacking
Storage temperature range	T_use	-10 °C to +60 °C		
Level of drive	DL	1.0 $\mu$ W Max.		
Frequency tolerance (standard)	f_tol	$\pm 20 \times 10^{-6}, \pm 50 \times 10^{-6}, \pm 100 \times 10^{-6}$ (307.2 kHz: $\pm 100 \times 10^{-6}$ )	$\pm 50 \times 10^{-6}, \pm 100 \times 10^{-6}$	+25 °C, DL=0.1 $\mu$ W
Turnover temperature	Ti	+25 °C $\pm 5$ °C		
Parabolic coefficient	B	$-0.04 \times 10^{-6} / ^\circ\text{C}^2$ Max.		
Load capacitance	CL	6 pF to $\infty$		Please specify
Motional resistance (ESR)	R <sub>1</sub>	55 k $\Omega$ to 6 k $\Omega$	55 k $\Omega$ to 10 k $\Omega$	As per below table
Motional capacitance	C <sub>1</sub>	4.0 fF to 0.6 fF		
Shunt capacitance	C <sub>0</sub>	2.0 pF to 0.6 pF		
Frequency aging	f_age	$\pm 5 \times 10^{-6} / \text{year}$ Max.		+25 °C, First year

### Motional resistance C-2- TYPE

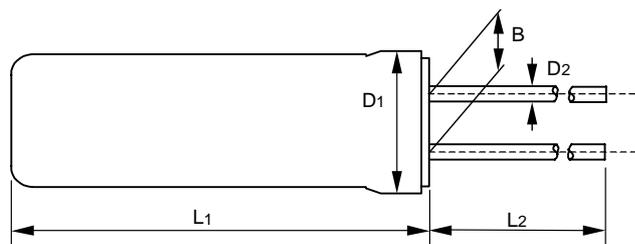
Frequency	20 kHz $\leq$ f < 31.2 kHz	31.2 kHz $\leq$ f < 40 kHz	40 kHz $\leq$ f < 90 kHz	90 kHz $\leq$ f < 130 kHz	130 kHz $\leq$ f < 165 kHz	307.2 kHz
Motional resistance	55 k $\Omega$ Max.	35 k $\Omega$ Max.	20 k $\Omega$ Max.	12 k $\Omega$ Max.	10 k $\Omega$ Max.	6 k $\Omega$ Max.

### Motional resistance C-4- TYPE

Frequency	32 kHz $\leq$ f < 38 kHz	38 kHz $\leq$ f < 60 kHz	60 kHz $\leq$ f < 74 kHz	74 kHz $\leq$ f < 100 kHz	100 kHz $\leq$ f < 120 kHz	192 kHz
Motional resistance	55 k $\Omega$ Max.	30 k $\Omega$ Max.	25 k $\Omega$ Max.	22 k $\Omega$ Max.	15 k $\Omega$ Max.	10 k $\Omega$ Max.

### External dimensions

(Unit:mm)



Model	L1	L2	D1	D2	B
C-001R	8.0 Max.	9.0 Min.	$\phi 3.1$ Max.	$\phi 0.3$	1.1
C-002RX C-2-TYPE	6.0 Max.	4.0 Min.	$\phi 2.0$ Max.	$\phi 0.2$	0.7
C-004R C-4-TYPE	5.0 Max.	4.0 Min.	$\phi 1.5$ Max.	$\phi 0.18$	0.5
C-005R	4.6 Max.	4.0 Min.	$\phi 1.2$ Max.	$\phi 0.15$	0.3

160 kHz to 165 kHz, 307.2 kHz: D1 =  $\phi 2.2$  Max.

# “3D STRATEGY” EPSON TOYOCOM

In order to meet customer needs in a rapidly advancing digital, broadband and ubiquitous society, we are committed to offering products that are one step ahead of the market and a rank above the rest in quality. To achieve our goals, we follow a “3D (three device) strategy” designed to drive both horizontal and vertical growth. We will to grow our three device categories of “Timing Devices”, “Sensing Devices” and “Optical Devices”, and expand vertical growth through a combination of products from these categories.

Quartz devices have become crucial in the network environment where products are increasingly intended for broadband, ubiquitous applications and where various types of terminals can transfer information almost immediately via LAN and WAN on a global scale. Epson Toyocom Corporation addresses every single aspect within a network environment. The new corporation offers “Digital Convergence” solutions to problems arising with products for consumer use, such as, core network systems and automotive systems.

## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Epson Toyocom, all environmental initiatives operate under the Plan-Do-Check-Action(PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard. All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification. In the future, new group companies will be expected to acquire the certification around the third year of operations.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

## WORKING FOR HIGH QUALITY

Epson Toyocom quickly began working to acquire company-wide ISO 9000 series certification, and has acquired ISO 9001 or ISO 9002 certification for all targeted products manufactured in Japanese and overseas plants.

Epson Toyocom has acquired QS-9000 certification, which is of a higher level. Also, TS 16949 certification, which is also of a higher level, has been acquired.

QS-9000 is an enhanced standard for quality assurance systems formulated by leading U.S. automobile manufacturers based on the international ISO 9000 series.

ISO/TS 16949 is a global standard based on QS-9000, a severe standard corresponding to the requirements from the automobile industry.

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/ traffic control equipment / and others requiring equivalent reliability.
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We apologize for the inconvenience, but we will eventually have a unified part numbering system for Epson Toyocom that will be user friendly.