INFORMATION

MODEL : C-002RZ

INFO. No. : Q12-127-16B

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INTRODUCTION

1. The contents is subject to change without notice. Please exchange the specification sheets regarding the product's warranty.

2. This sheet is not intended to guarantee or provide an approval of implementation of industrial patents.

3. We have prepared this sheet as carefully as possible. If you find it incomplete or unsatisfactory in any respect, We would welcome your comments.

1) This product complies with RoHS Directive.
2) This Product supplied (and any technical information furnished, if any) by Seiko Epson Corporation shall not be used for the development and manufacture of weapon of mass destruction or for other military purposes.
Making available such products and technology to any third party who may use such products or technologies for the said purposes are also prohibited.
3) This product listed here is designed as components or parts for electronics equipment in general consumer use.
We do not expect that any of these products would be incorporated or otherwise used as a component or part for the equipment, which requires an systems, and medical equipment, the functional purpose of which is to keep extra high reliability, such as satellite, rocket and other space life.

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[1] Absolute maximum ratings

No.	Item	Symbol	Rating value			Unit	Note
			Min.	Typ.	Max.		
1	Storage temperature range	T_stg	-20		+70	°C	Suppose to be within CI STD at +25 °C ± 3 °C.
2	Maximum level of drive	GL		1.0		μW	

[2] Operating range

No.	Item	Symbol	Rating value			Unit	Note
			Min.	Typ.	Max.		
1	Operating temperature range	T_use	-10		+60	°C	
2	Level of drive	DL		0.1		μW	
3	Vibration mode		Fundamental				

[3] Static characteristics

No.	Item		Symbol	Value	Unit	Conditions
1	Nominal Frequency		f_nom	32.768	kHz	
2	Frequency tolerance		f_tol	Reference to the frequency List (P.7)	$\times 10^{-6}$	CL = Reference to the frequency List (P.7) Ta = +25± 3°C Level of drive : 0.1 μW Not include aging
3	Quality factor		Q	3.0 Min.	$\times 10^{4}$	Decay method
4	Motional resistance		R1	60 Max.	kΩ	CI meter : Saunders 140B Level of drive :1.0 μW
5	Motional capacitance		C1	1.7 Typ.	fF	
6	Shunt capacitance		C0	0.75 Typ.	pF	
7	Frequency temperature characteristics	Turnover temperature	Ti	+25 ± 5	°C	Values are calculated by The frequencies at +10, +25, +40°C with C-MOS circuit.
		Parabolic coefficient	B	-0.04 Max.	$\times 10^{-6}/°C^{2}$	
8	Isolation resistance		IR	500 Min	MΩ	DC 100V, 60 sec. between terminals or terminal and case
9	Frequency Aging		f_age	± 3	$\times 10^{-6}$/year	Ta = +25 °C ± 3 °C Level of drive : 0.1 μW
10	Against pressure			± 5	$\times 10^{-6}$	Frequency shift at case cramped.

[4] Environmental characteristics

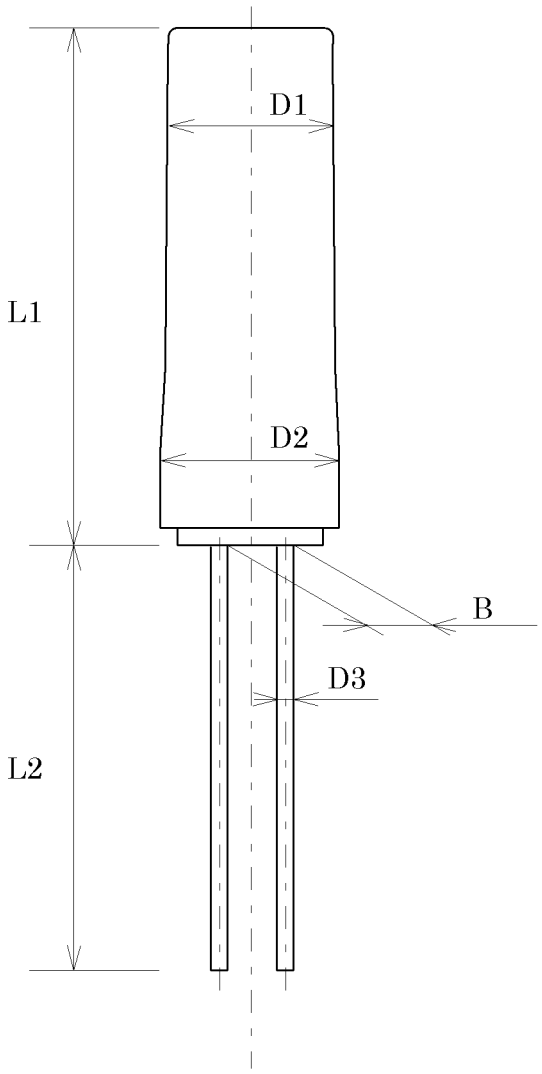
(The company evaluation condition We evaluate it by the following examination item and examination condition.)

No.	Item	Value *1	Test Conditions
		$\Delta f / f$ [1×10^{-6}] *2	
1	Drop	± 5	Free drop from 750 mm height on a hard wooden board for 3 times (Board is thickness more than 30 mm)
2	Vibration	± 3	10 Hz to 55 Hz amplitude 0.75 mm 55 Hz to 500 Hz acceleration 98 m/s^2 10 Hz → 500 Hz → 10 Hz 15 min./cycle 6 h (2 hours , 3 directions)
3	High temperature storage	± 5	+80 °C × 240 h
4	Low temperature storage	± 5	-20 °C × 240 h
5	Temperature cycle	± 5	-20 °C ↔ +80 °C 30 min. at each temp. 20 cycle
6	Resistance to soldering heat for wire termination	± 3	Dip wire termination on closer than 2 mm from the case into solder bath at +280 °C ± 10 °C for 5 s
7	Tensile test on termination	± 3 No defect for wire termination	Pulling a wire termination with 10 N weight for 5 s
8	Flexibility of termination	± 3 No defect for wire termination	A point 1 mm from the base is bent following angle : +90° → -90° → 0° (R 0.5)
9	Solderability	Termination must be 95 % covered with fresh solder	Dip termination into solder bath at +240 °C ± 10 °C for 3 s (Using Rosin Flux)

< Notes >

1. *1 Each test done independently.
2. *2 Measuring 2 h to 24 h later leaving in room temperature after each test.

[5] Dimensions



L1	L2	D1	D2	D3	B
6.0Max.	4.0 Min.	± 0.05 ϕ 1.88	ϕ 2.0 Max.	± 0.07 ϕ 0.2	± 0.15 0.7

Type	C-002RZ	Lead terminal Finish	Pb Free Solder plate	Unit	1 = 1 mm

[6] Notes

1. Soldering conditions: heat only a lead wire part.
   If the temperature of the package exceeds +150 °C., the crystal unit may be damaged or its characteristic may be impaired.

2. Bending the lead too closely to the case or pulling the lead strongly may cause the hermetic glass seal to crack. If the lead needs to bend, please leave more than 0.5 mm from the lead to the case.

3. Excessive pressure may cause leakage of hermetically. Please take caution not to give excessive press to the sealed part of the package.

4. Excessive shock or vibration is not allowed. The internal crystal unit may be damaged from machine shock during assembly. Please check conditions carefully prior to use.

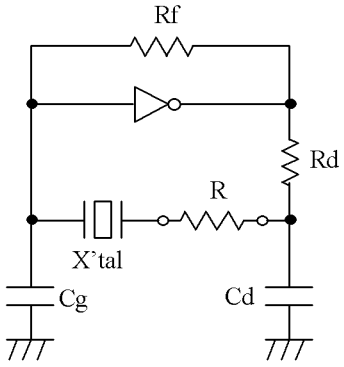
5. To avoid condensation, do not store or use in an environment where temperatures may change rapidly. We recommend that products be stored in an environment where temperature and humidity are normal.

6. Products using a tuning fork crystal can not be guaranteed for ultrasonic cleaning because they may be damaged by resonance vibration.

7. Applying excessive drive level to the crystal unit may cause deterioration or damage.
   Circuit design must be such that the proper drive level is maintained.

8. Unless adequate negative resistance is allocated in the oscillation circuit, start up time of oscillation may be increased or stopped. In order to avoid this, please provide enough negative resistance in the circuit design.

   How to check the negative resistance [-NR]



(1) Connect the resister (R) to the circuit in series with the crystal unit.

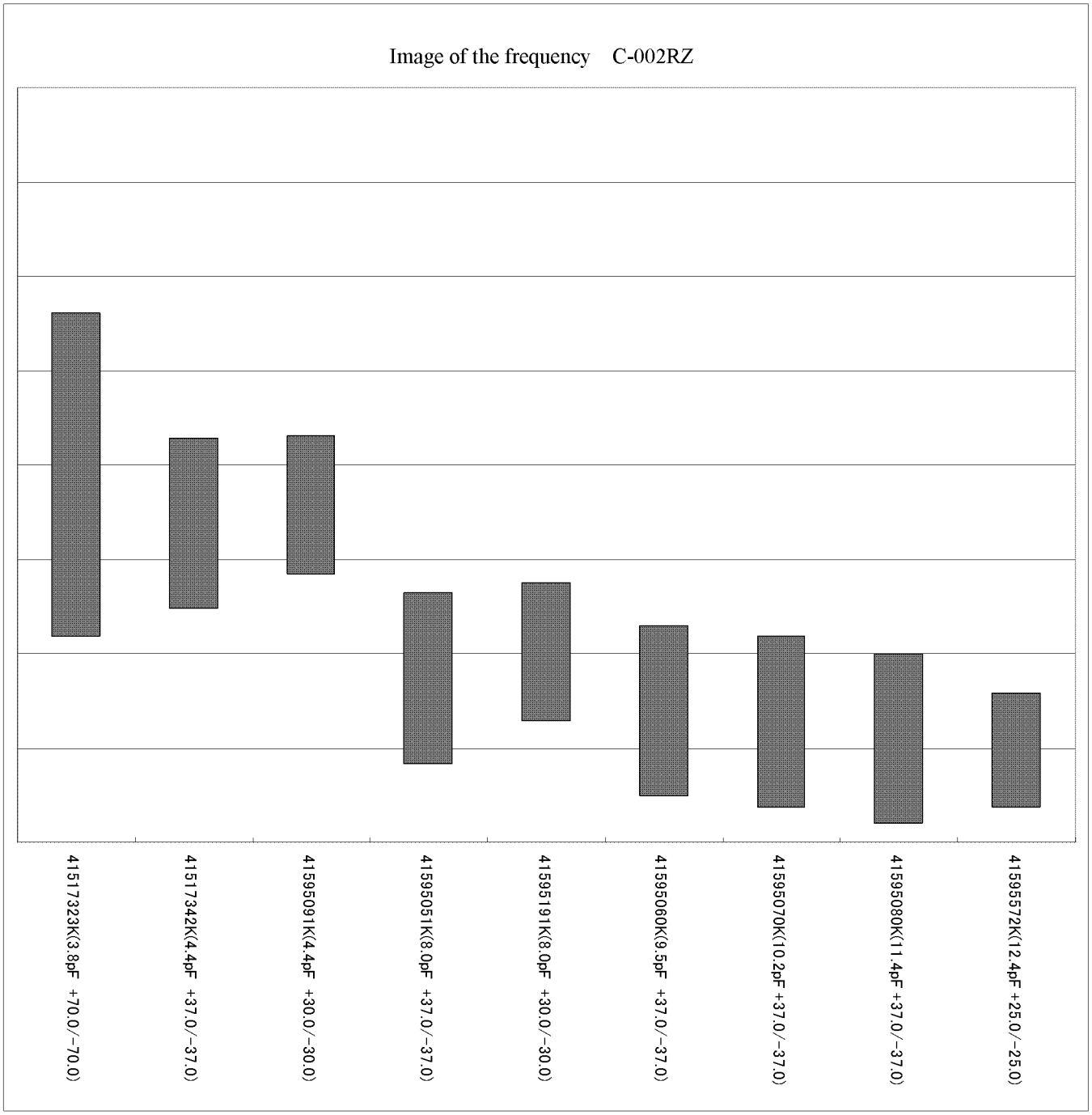
(2) Adjust (R) so that oscillation can start (or stop).

(3) Measure (R) when oscillation just start (or stop) in above (2).

(4) Get the negative resistance.
   [-NR] = R + CI value

(5) Recommended [-NR]
   [-NR] > CI (Max.) × 5

[7] Image of the frequency



Attachment

Frequency List

Type:C-002RZ

	CL [pF]	Frequency tolerance [1×10^{-6}]	Watch Dev. Part No.	Specification	Product No.	Issue Date	Note
1	4.4	± 37.0	41517342K	32.768000 kHz 4.4 pF +37.0/-37.0	Q11C02RZ10020	'09.10.01	
2	3.8	± 70.0	41517323K	32.768000 kHz 3.8 pF +70.0/-70.0	Q11C02RZ10009	'09.10.01	
3	8.0	± 37.0	41595051K	32.768000 kHz 8.0 pF +37.0/-37.0	Q11C02RZ10015	'09.10.01	
4	9.5	± 37.0	41595060K	32.768000 kHz 9.5 pF +37.0/-37.0	Q11C02RZ10019	'09.10.01	
5	10.2	± 37.0	41595070K	32.768000 kHz 10.2 pF +37.0/-37.0	Q11C02RZ10021	'09.10.01	
6	11.4	± 37.0	41595080K	32.768000 kHz 11.4 pF +37.0/-37.0	Q11C02RZ10022	'09.10.01	
7	12.4	± 25.0	41595572K	32.768000 kHz 12.4 pF +25.0/-25.0	Q11C02RZ10023	'09.10.01	

PACKING SPECIFICATIONS

1. Application

This document is applicable to C-001Type, C-002Type, C-004Type, C-005Type, C-2Type,C-4Type.

2. Packing specifications

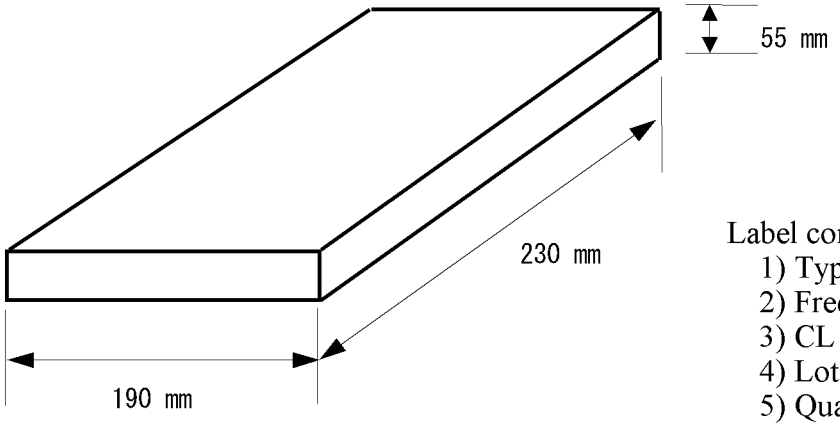
(1) • Put the crystal resonators into a polyethylene bag.

- Quantity : as per below table
- Sealing to bag.

(2) • Material of box : Cardboard

- Buffer : Put buffer sheet inside of top and the bottom of box.
- Quantity : as per below table

Type	Polyethylene bag. Quantity	Material of box. Quantity
C-001Type	250 pcs. / bag.	5000 pcs. / box.
C-002Type C-004Type C-005Type C-2Type C-4Type	500 pcs. / bag.	5000 pcs. / box.
Reflowable C-002SType C-004SH C-005SH	1000 pcs. / bag.	10000 pcs. / box.



Label contents
1) Type
2) Frequency
3) CL
4) Lot No.
5) Quantity