[1] Absolute maximum ratings

No.	Parameter	Symbol	Rating value	Note
1	Storage temperature	TSTG	-20°C to +70°C	Suppose to be within CI STD at +25°C ± 3°C
2	Maximum drive level	GL	1 μW	

[2] Operating range

No.	Parameter	Symbol	Value			Note
			Min.	Typ.	Max.	
1	Operating range	TOPR	-10°C		+60°C	
2	Drive level	DL		0.1 μW		
3	Vibration mode		Fundamental			

[3] Electrical characteristics

No.	Parameter	Symbol	Standard	Conditions
1	Frequency	fo	32.768 kHz	
2	Frequency tolerance	Δ f/f	$\pm 8 \times 10^{-6}$	CL =12.5 pF Ta = +25 ± 3°C DL = 0.1 μW Excluding aging value
3	Quality factor	Q	Min. 5.0×10^{4}	
4	Series resistance	R1	50 kΩ max. (30 kΩ typ.)	CI meter : Saunders 140-B DL = 1.0 μW
5	Motional capacitance	C1	Typ. 2.0 fF	
6	Shunt capacitance	C0	Typ. 0.85 pF	
7	Turnover temperature	θT	+25 ± 5°C	Value calculated on temperature +10, 25, 40 °C degree with C-MOS circuit.
8	Parabolic coefficient	α	Max. -4.0×10^{-8} / °C ^{2}	
9	Insulation resistance	IR	Min. 500 MΩ	DC 100V, 60 sec. between terminals or terminal and case
10	Aging		$\pm 3 \times 10^{-6}$ / year	Ta = +25 °C ± 3 °C DL = 0.1 μW
11	Against pressure		$\pm 5 \times 10^{-6}$	Frequency shift at case cramped.

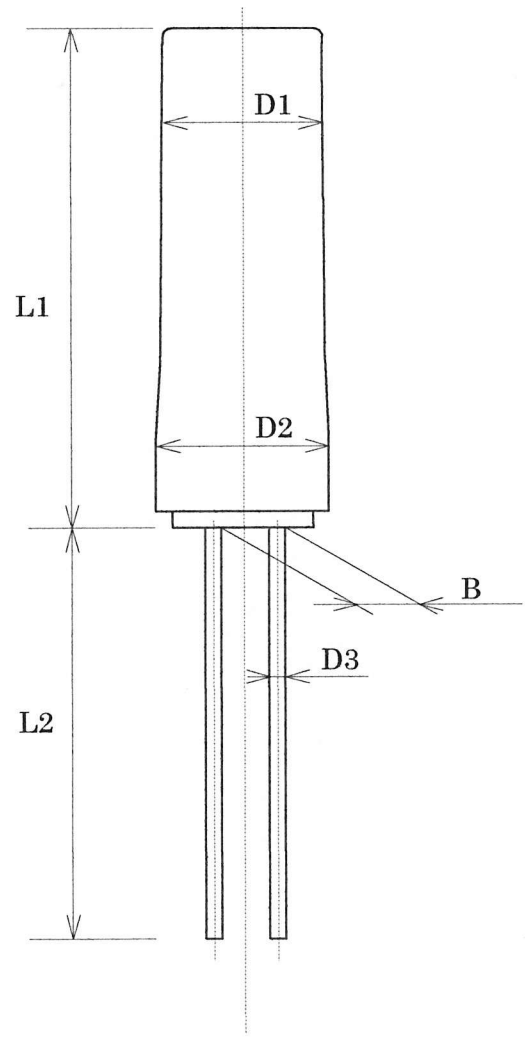
[4] Environmental characteristics

No.	Item	Value *1*2	Test Conditions
		$\Delta f/f[1x10^{-6}]$	
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 → 10Hz 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 10N 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)

<Note>

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
Max.	Min.	± 0.05	Max.	± 0.07	± 0.15
6.0	4.0	ϕ 1.88	ϕ 2.0	ϕ 0.2	0.7

Unit : 1 = 1 mm

Type		Lead terminal Finish	Pb Free Solder plate	Unit	1 = 1 mm

[6] Notes

1. If the temperature of the package exceeds 150 deg., the crystal resonator 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 resonator may be damaged from machine shock during assembly. Please check conditions carefully prior to use.

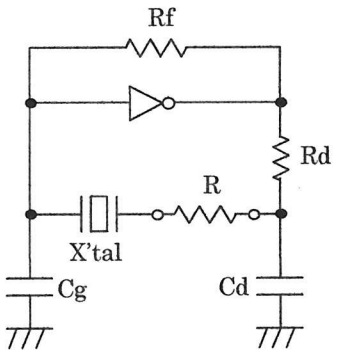
5. To avoid condensation, do not store or use in an environment where temperatures may change rapidly. We recommend that products be stored in an environment where temperature and humidity are normal.

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

7. Applying excessive drive level to the crystal resonator 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 resonator.

(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 to 10)