



TF Series



- Photolithography finished allows uniform stable performance
- Excellent shock resistance and environmental capability
- Low power consumption
- Suitable for time-keeping of clock and microcomputer

PART NUMBER GUIDE

TF-206GW - 32.768 - 20 - E - 125

PACKAGE TYPE

- TF-105** : cylinder type - 1.4x5mm
- TF-206** : cylinder type - 2x6mm
- TF-308** : cylinder type - 3x8mm
- TF-206GW, 308GW** : Gull Wing type
- C-80** : SMD type - 8.0x3.8x2.6mm
- C-32** : SMD type - 3.2x1.5x1.1mm
- C-45** : SMD type - 4.5x1.5x0.9mm

FREQUENCY

32.768KHz
30.720KHz~153.600KHz

FREQUENCY TOLERANCE AT 25°C
±20 ppm (STD)

LOAD CAPACITANCE

125 : 12,5pF

OPERATING TEMPERATURE
TABLE 1

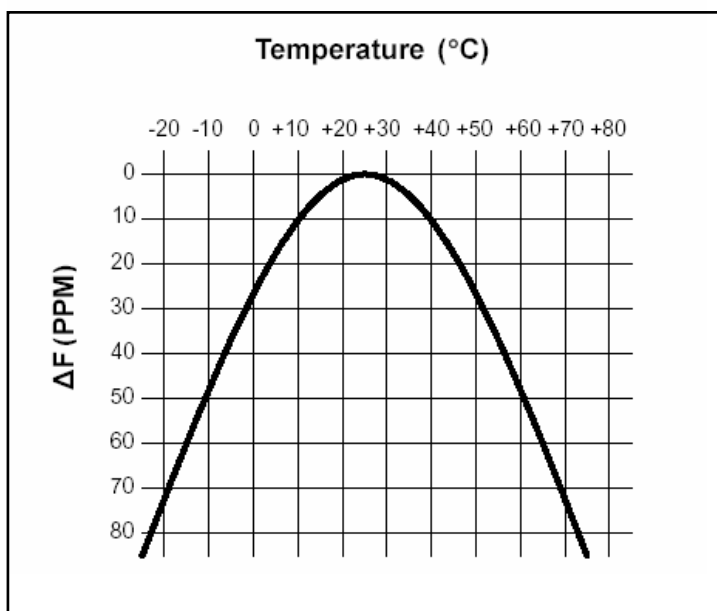
ELECTRICAL SPECIFICATIONS

MODEL	TF serie
Nominal Frequency	32.768KHz
Operating Temperature Range	-20 to +70°C(STD)
Storage Temperature Range	-55 to +125°C
Frequency Tolerance (at 25°C)	+/-20ppm
Temperature Coefficient (frequency)	-0.034ppm/ °C ² Max
Load Capacitance (CL)	12.5pF
Drive Level	1.0 μWMax
Series Resistance	40kΩ Max
Shunt Capacitance (Co)	1.0pF
Aging (at 25°C)	3.0ppm/year Max

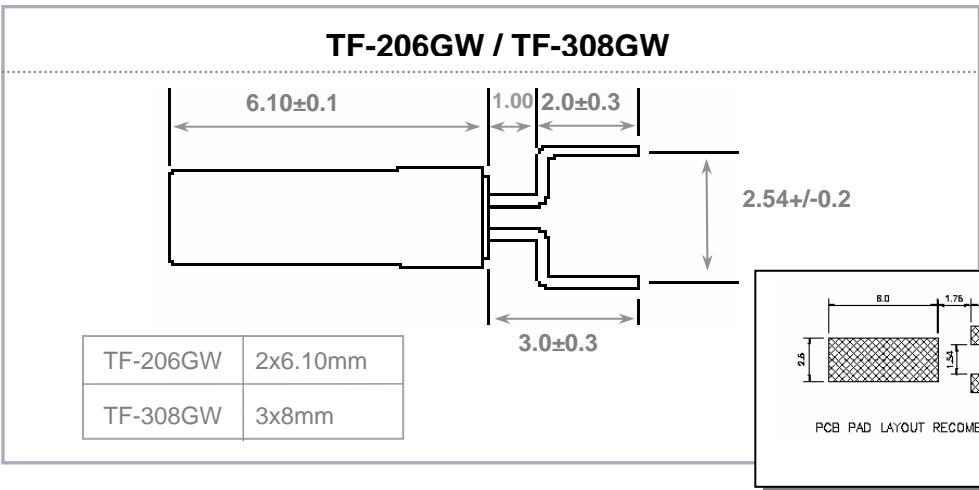
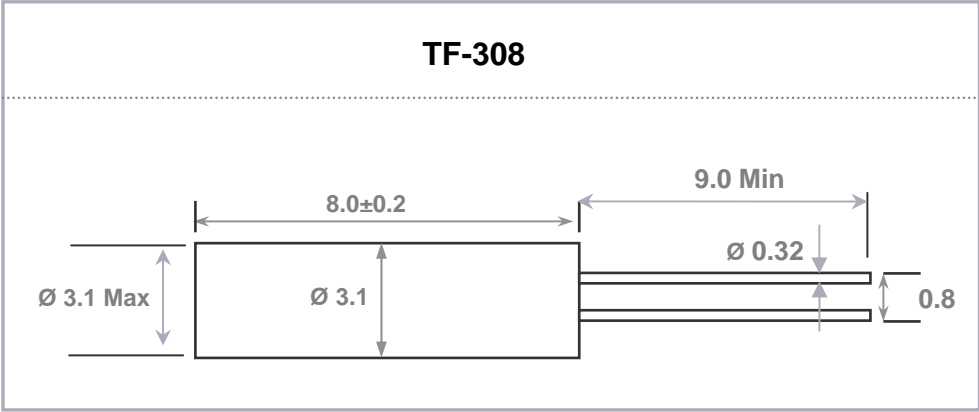
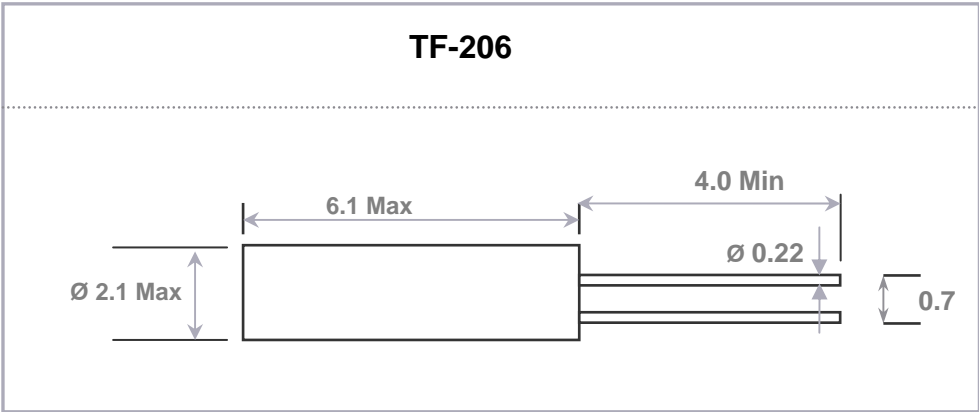
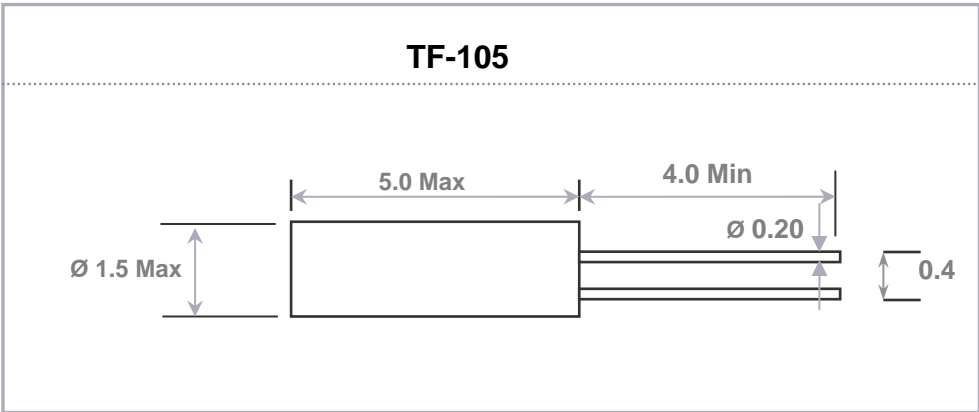
TABLE 1

OPERATING TEMPERATURE RANGE	
-10~+60°C	A
-20~+60°C	B
0~+70°C	C
-10~+70°C	D
-20~+70°C	E
-30~+60°C	F
-20~+85°C	G
-30~+70°C	H
-30~+85°C	I
-40~+85°C	J

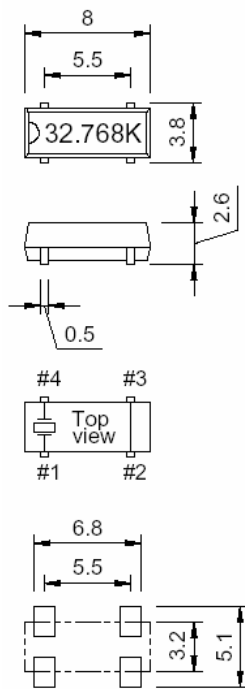
TEMPERATURE CHARACTERISTIC



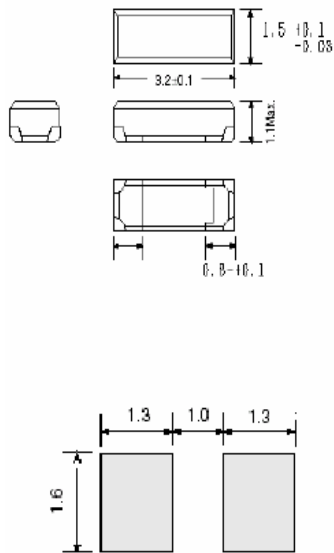
MECHANICAL DIMENSION



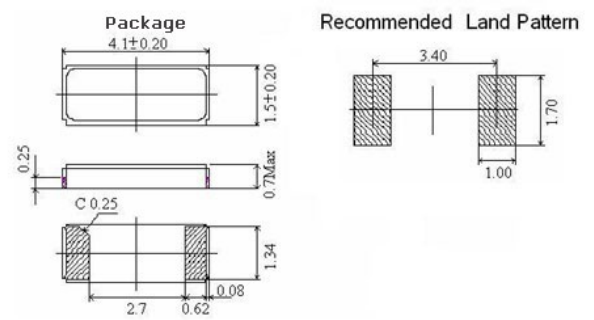
C-80

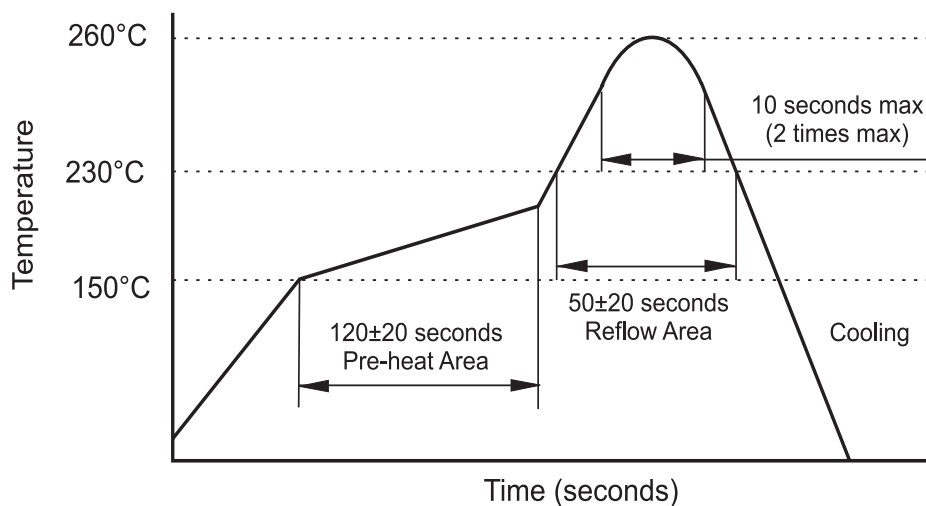


C-32



C-45



SOLDERING REFLOW**Pb-free compliance**

Component and Assembly Pb content shall be less than 0.1% by weight of the device (in accordance with IPC/EIA J-STD-006) and shall not be intentionally introduced.

Product Information

For a product to be **RoHS** compliant, it must satisfy several conditions:

- Contain no more than the specified limits of the target hazardous substances set out in the RoHS Directive
- Able to withstand Pb-free 260°C solder reflow profile below
- External packaging and terminations are Pb-free
- Internal PCB, components, solders, and terminations are Pb-free

SPECIFICATION OF CRYSTAL

Reliability Test (applicable to OSC and SMD type X'tal)

Test Items	Test Condition	Specification	
		General OSC (Note:1)	General X' tal (Note:2)
1. Gross Leak Test	FC-40 125°C/30sec	No continuous bubble	
2. Fine Leak Test	Bombing of He 5kg/cm ² for 2 hours	Less than 1*10 ⁻⁸ atm.c.c./sec, Helium	
3. Drop Test	Free dropped a. ~19.999MHz(Fund.) →100 cm height b. 20~29.999MHz(Fund.) →50 cm height c. 30~ MHz(Fund.) →20 cm height on a hard wooden board for 3 times (board is thickness more than 30 mm)	$\Delta F \leq \pm 10\text{PPM}$, Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$, $\Delta \text{C.I.} \leq \pm 10\text{ohms}$
4. Vibration Test	Freq. range: 10~55Hz Peak to peak amplitude:1.5mm Peak acceleration:10 G 3 direction(X,Y,Z) , each 60min.	$\Delta F \leq \pm 10\text{PPM}$, Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$, $\Delta \text{C.I.} \leq \pm 10\text{ohms}$
5. Resistance to Soldering Test	a. IR Reflow furnace with the condition 2 times. Peak temp. 260±3°C , 10sec(Min.)	$\Delta F \leq \pm 10\text{PPM}$, Duty within spec. For SMD OSC only	$\Delta F \leq \pm 10\text{PPM}$, $\Delta \text{C.I.} \leq \pm 10\text{ohms}$
	b. Dip terminals in a 260±5°C solder bath for 5±0.5 sec.	At least 90% of each dipped area shall be covered by fresh solder. For DIP OSC only.	NA
6. Bending Test	Bending cycle : 1 cycle 0° -> 45° -> 0° -> 45° -> 0°	$\Delta F \leq \pm 5\text{PPM}$, Duty within spec. For DIP OSC only.	NA
7. Share Test	Weight : 10N, Test duration : 10±1 sec	$\Delta F \leq \pm 5\text{PPM}$, Duty within spec. For SMD OSC only.	$\Delta F \leq \pm 10\text{PPM}$, $\Delta \text{C.I.} \leq \pm 10\text{ohms}$
8. Low Temp. Exposure Test	-40±3°C , 240±12 hrs	$\Delta F \leq \pm 10\text{PPM}$, Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$, $\Delta \text{C.I.} \leq \pm 10\text{ohms}$
9. Aging Test	125±3°C , 240±12hrs	$\Delta F \leq \pm 10\text{PPM}$, Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$, $\Delta \text{C.I.} \leq \pm 10\text{ohms}$
10. High Temp. & Humidity Test	+85°C±5°C & 85%±5% R.H. , 240±12 hrs	$\Delta F \leq \pm 10\text{PPM}$, Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$, $\Delta \text{C.I.} \leq \pm 10\text{ohms}$
11. Temperature Cycling Test	-40±3°C/15±3min ~ +85±3°C/15±3min 15cycles	$\Delta F \leq \pm 10\text{PPM}$, Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$, $\Delta \text{C.I.} \leq \pm 10\text{ohms}$

Note:1 → For communication application the spec. demanded " $\Delta F \leq \pm 5\text{ PPM}$, Duty within spec." .

Note:2 → For communication application the spec. demanded " $\Delta F \leq \pm 5\text{ PPM}$, $\Delta \text{C.I.} \leq \pm 5\text{ ohms}$ " .