

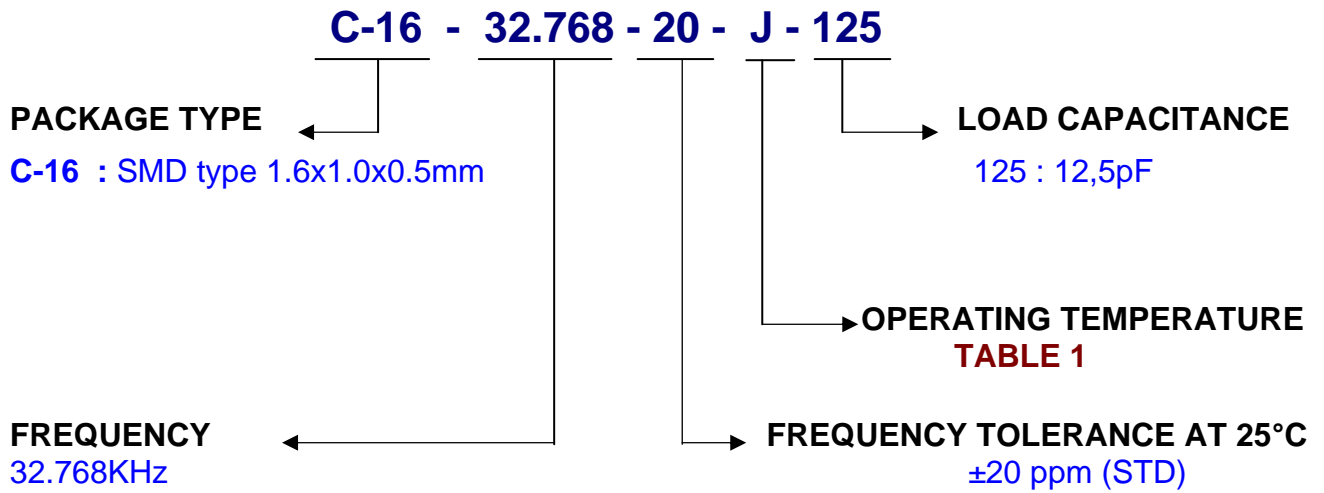
## C Series



- Ultra miniature size
- Excellent aging characteristics
- Reflow soldering



### PART NUMBER GUIDE



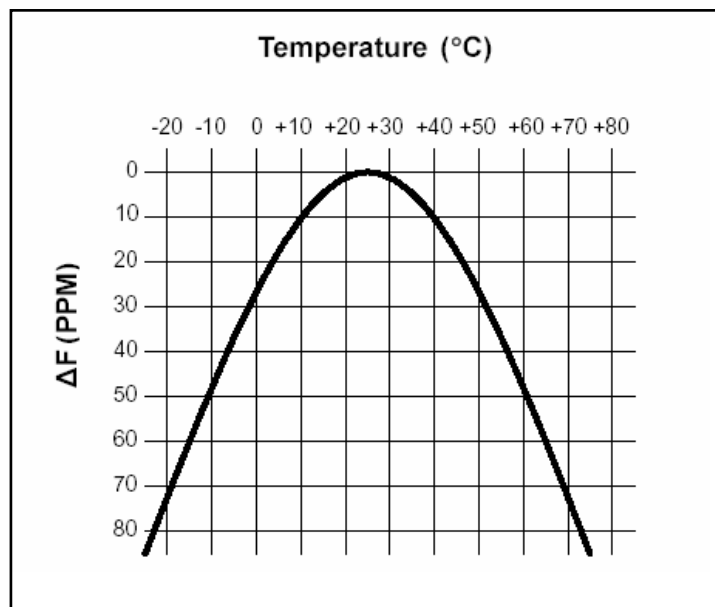
### ELECTRICAL SPECIFICATIONS

MODEL	C-16 serie
Nominal Frequency	32.768KHz
Frequency Tolerance (at 25°C)	±20ppm
Operating Temperature Range	-40 to +85°C(STD)
Storage Temperature Range	-55°C to +125°C
Turnover Temperature	25°C ±5°C
Temperature Coefficient (frequency)	-0.045ppm/ °C <sup>2</sup> Max
Load Capacitance (CL)	12.5pF
Drive Level	0.1 μW
Series Resistance (ESR)	90kΩ Max
Motional Capacitance	1.80pF to 2.10pF
Shunt Capacitance (Co)	0.08pF to 0.90pF
Insulation Resistance	500 MΩ Min atDC100V ±15V
Aging (at 25°C)	± 3ppm/year Max
Packing	5000/Reel

TABLE 1

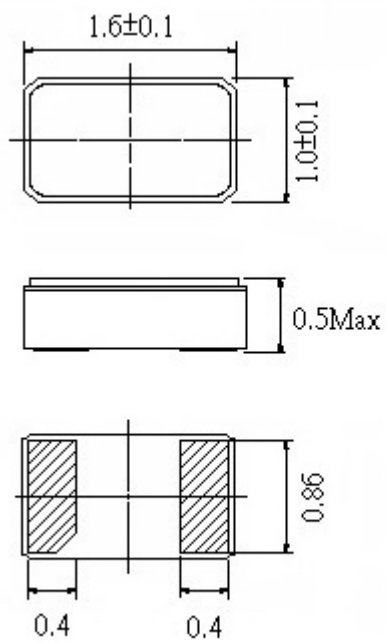
OPERATING TEMPERATURE RANGE	
-10~+60°C	A
-20~+60°C	B
0~+70°C	C
-10~+70°C	D
-20~+70°C	E
-30~+60°C	F
-20~+85°C	G
-30~+70°C	H
-30~+85°C	I
-40~+85°C	J

## TEMPERATURE CHARACTERISTIC

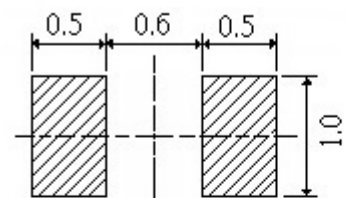


## MECHANICAL DIMENSION

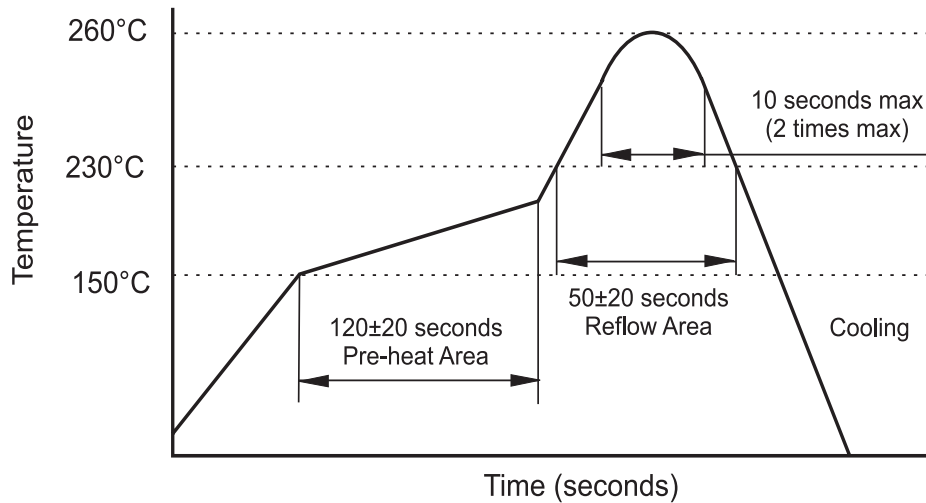
## C-16



## Recommended Soldering Pattern



## SOLDERING REFLOW



## RoHS and REACH Regulation



### 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

### EACH Regulation (EC) 1907/2006

Above concerned part is compliant with all requirement in the REACH regulaitions EC No. 1907/2006.

<b>SPECIFICATION OF CRYSTAL</b>
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**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 <sup>2</sup> for 2 hours	Less than 1*10 <sup>-8</sup> 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 " $\Delta F \leq \pm 5\text{ PPM}$ ,  $\Delta \text{C.I.} \leq \pm 5\text{ ohms}$ " .