

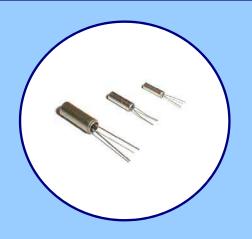
# TFNC SERIES



## TUNING FORK CRYSTALS

## **FEATURES**

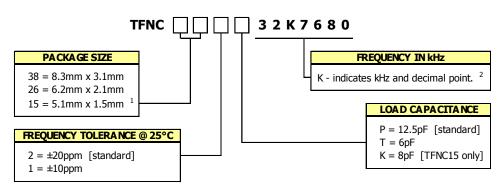
- 32.7680 kHz Frequency Reference
- Tuning Fork Crystal Design
- Package Sizes 8.3mmx3.1mm, 6.2mmx2.1mm, 5.1mmx1.5mm
- Cylindrical Package
- Frequency Tolerance, ±20 ppm Standard
- Frequency Temperature Coefficient, -0.035ppm/°C<sup>2</sup>
- Operating Temperature, -10°C to +60°C Standard
- Packaging, Bulk in Bag
- RoHS Compliant in Accordance with EU Directive 2011/65/EU



## **APPLICATIONS**

The TFNC crystal series is ideal for use in a wide range of applications requiring a real-time frequency reference. Compatible to Citizen CFS Series and Epson C-Type.

## **ORDERING INFORMATION**



- 1] Contact factory for availability and MOQ requirements.
- 2] Frequency is recorded with two leading digits before the 'K' and 4 significant digits after the 'K' (including zeros).

Not all performance combinations and frequencies may be available. Contact your local CTS Representative or CTS Customer Service for availability.

## **PACKAGING INFORMATION** [reference]

Packaging format is bulk in bag. Maximum 500pcs. per bag.

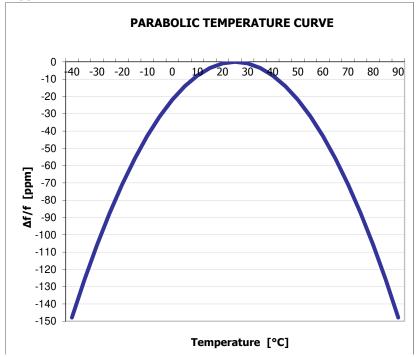


## **ELECTRICAL CHARACTERISTICS**

	PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
ELECTRICAL PARAMETERS	Frequency	$f_0$			32.7680		kHz
	Operating Mode	-		Flexural Mode [Tuning Fork]			-
	Frequency Tolerance *	$\Delta f/f_0$	@+25°C	-	10 or 20	-	± ppm
	Frequency Temperature Coefficient	∆f/f <sub>M</sub>		-0.035 ±0.006ppm/°C <sup>2</sup>			-
	Frequency Stability			See Figure 1			
	Operating Temperature Range	T <sub>A</sub>		-10	-	+60	°C
	Turnover Temperature	T <sub>M</sub>	±5°C	-	+25	ı	°C
	Load Capacitance *	C <sub>L</sub>	TFNC38, TFNC26	-	12.5	1	- pF
			TFNC15	-	8.0	-	
	Aging	$\Delta f/f_0$	@+25°C, 1st year	-	-	3.0	± ppm
	Drive Level	DL		-	-	1.0	μW
	Shunt Capacitance	C <sub>0</sub>	TFNC38	-	1.6	-	pF
			TFNC26	-	1.35	ı	
			TFNC15	-	1.0	-	
	Motional Capacitance	$C_1$		-	3.0	-	fF
	Series Resistance	R <sub>1</sub>	·	-	-	50	k Ohms
	Insulation Resistance	R <sub>i</sub>	+100Vdc ±15Vdc	500	-	-	M Ohms
	Storage Temperature Range	$T_{STR}$		-40	-	+85	°C

<sup>\*</sup> See Ordering Information for available options.

### FIGURE 1



Frequency stability [ppm] is determined using parabolic curve,  $\Delta f$  = Temperature Coefficent(T\_A-T\_M)^2.

Ex. Find frequency stability at  $T_A = 45$ °C

 $\Delta f = -0.035(45-25)^2$ 

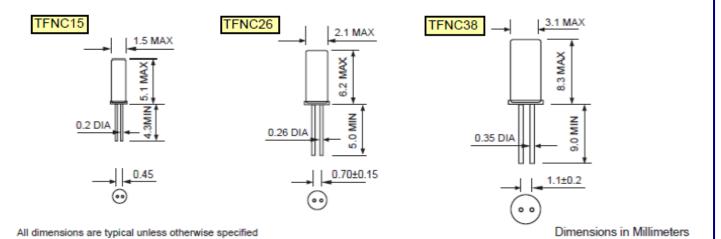
 $\Delta f = -0.035(20)^2$ 

 $\Delta f = -14.0 \text{ ppm}$ 



## **MECHANICAL SPECIFICATIONS**

### **PACKAGE DRAWINGS**



### **MARKING INFORMATION**

1. Product is not marked. See label on bag or carton.

#### **NOTES**

- 1. Complete CTS part number, frequency value, date code and manufacturing site code information must appear on bags and carton labels.
- Termination pads (e2); barrier plating is nickel [Ni] with tin [Sn] copper [Cu] finish.
  Soldering iron attach; 300°C maximum, 5 seconds.
- 4. MSL = 1.