

FEATURES

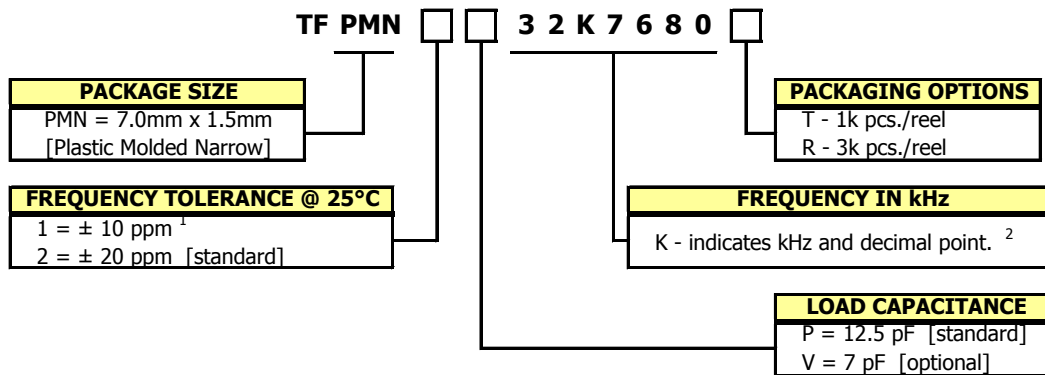
- **32.7680 kHz Frequency Reference**
- **Package Size 7.0mm x 1.5mm**
- **Tuning Fork Crystal Design**
- **Plastic Molded Package, Narrow Body**
- Frequency Tolerance, ± 20 ppm Standard
- Frequency Temperature Coefficient, $-0.034\text{ppm}/^\circ\text{C}^2$
- Operating Temperature, -40°C to $+85^\circ\text{C}$ Standard
- Tape & Reel Packaging, EIA-481
- **RoHS Compliant in Accordance with EU Directive 2011/65/EU**
 - Lead-Free Termination Finish
 - Exemption 7(a), Lead [Pb] in high melting temperature type solders



APPLICATIONS

The TFPMN crystal series is ideal for use in a wide range of applications requiring a real-time frequency reference. Compatible to Citizen CM310 and Epson MC-146.

ORDERING INFORMATION



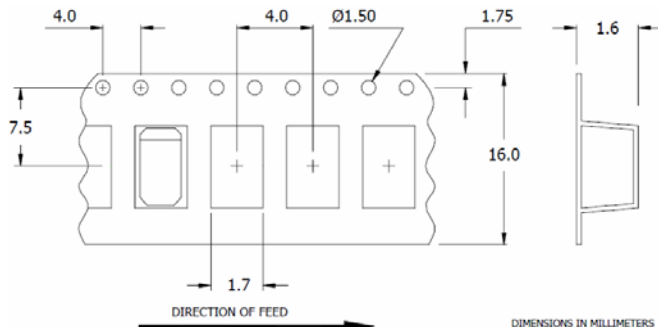
1] Contact factory for availability.

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]

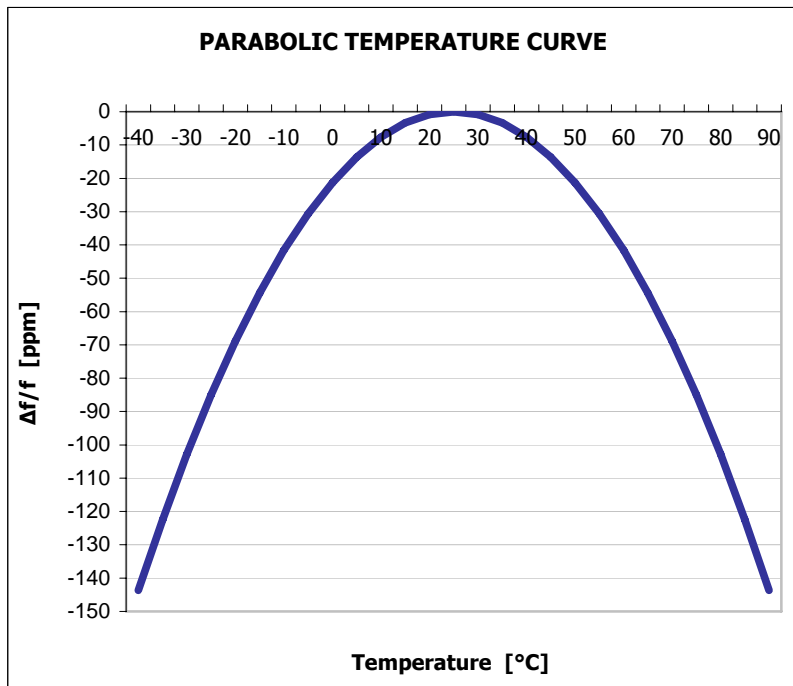
Device quantity is 1k pcs. minimum and 3k pcs. maximum [180mm reel].



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	-	20	-	± ppm
	Frequency Temperature Coefficient	$\Delta f/f_M$		-0.034±0.006ppm/°C ²			-
	Frequency Stability			See Figure 1			
	Operating Temperature Range	T_A		-40	-	+85	°C
	Turnover Temperature	T_M	±5°C	-	+25	-	°C
	Load Capacitance *	C_L	Standard	-	12.5	-	pF
	Aging	$\Delta f/f_0$	@+25°C, 1st year	-	-	3.0	± ppm
	Drive Level	DL		-	0.5	1.0	µW
	Shunt Capacitance	C_0		-	1.35	-	pF
	Motional Capacitance	C_1		-	2.1	-	fF
	Series Resistance	R_1		-	-	70	k Ohms
	Insulation Resistance	R_i	+100Vdc ±15Vdc	500	-	-	M Ohms
	Storage Temperature Range	T_{STR}		-40	-	+85	°C

FIGURE 1

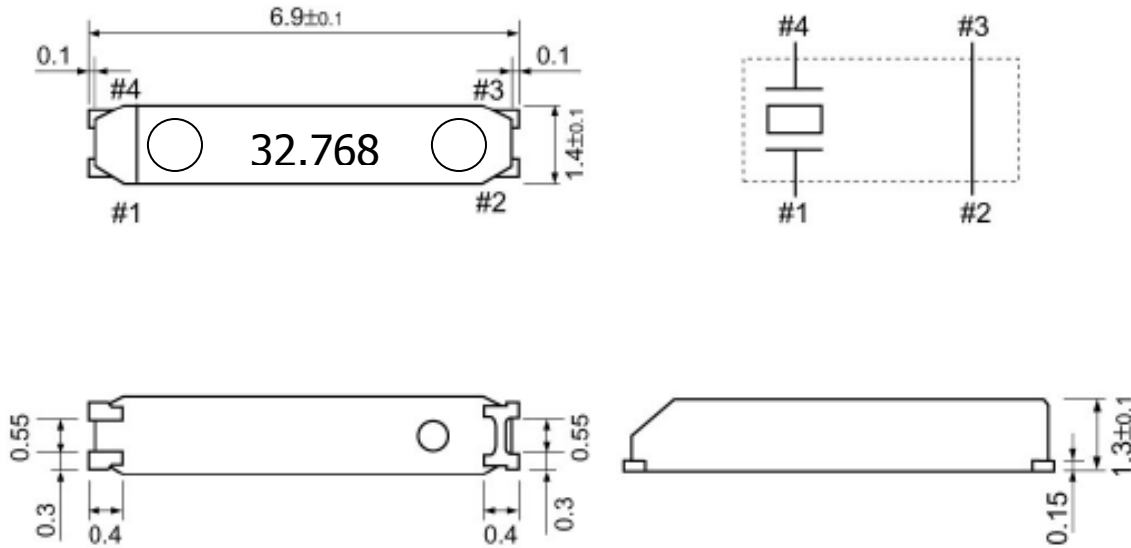


Frequency stability [ppm] is determined using parabolic curve, $\Delta f = \text{Temperature Coefficient}(T_A - T_M)^2$.

Ex. Find frequency stability at $T_A = 45^\circ\text{C}$
 $\Delta f = -0.034(45-25)^2$
 $\Delta f = -0.034(20)^2$
 $\Delta f = -13.6 \text{ ppm}$

MECHANICAL SPECIFICATIONS

PACKAGE DRAWING



* Do not connect to external with #2 and #3

MARKING INFORMATION

1. 32.768 – Frequency, 32.7680kHz.

NOTES

1. Complete CTS part number, frequency value, date code and manufacturing site code information must appear on reel and carton labels.
2. Leads (e3); tin [Sn].
3. Reflow conditions per JEDEC J-STD-020; 260°C maximum, 10 seconds.
4. MSL = 1.

SUGGESTED SOLDER PAD GEOMETRY

