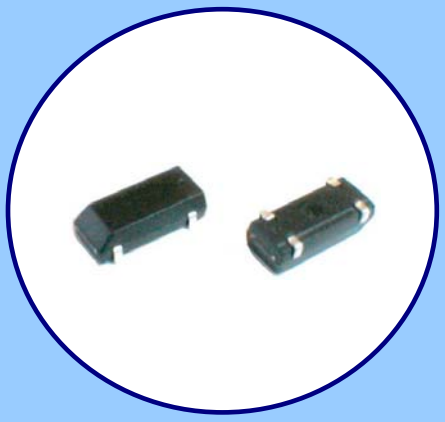
TFPM Series
Tuning Fork Crystal

FEATURES
- **32.7680 kHz Frequency Reference**
- **Package Size 8.0mm x 3.8mm**
- **Tuning Fork Crystal Design**
- **Plastic Molded Package**
- Frequency Tolerance, ±20 ppm Standard
- Frequency Temperature Coefficient, -0.034ppm/°C^2
- Operating Temperature, -40°C to +85°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 TFPM crystal series is ideal for use in a wide range of applications requiring a real-time frequency reference. Compatible to Citizen CM200C/S and Epson MC-306.

ORDERING INFORMATION

TF P M ☐ ☐ 3 2 K 7 6 8 0 ☐

PACKAGE SIZE
PM = 8.0mm x 3.8mm [Plastic Molded]

PACKAGING OPTIONS
T - 1k pcs./reel
R - 3k pcs./reel

FREQUENCY TOLERANCE @ 25°C
2 = ± 20 ppm [standard]

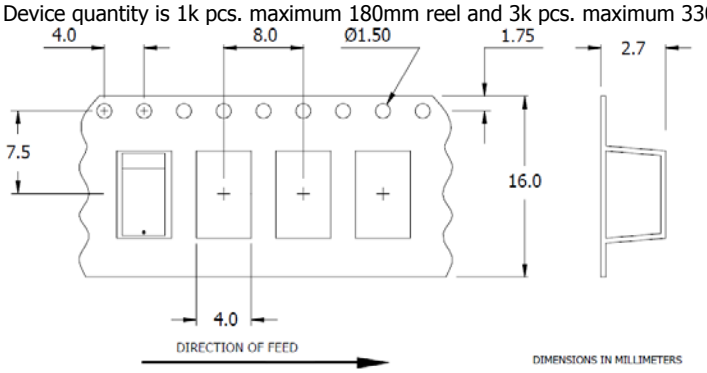
FREQUENCY IN kHz
K - indicates kHz and decimal point. [1]

LOAD CAPACITANCE
P = 12.5 pF [standard]
T = 6 pF [optional] [2]

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

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

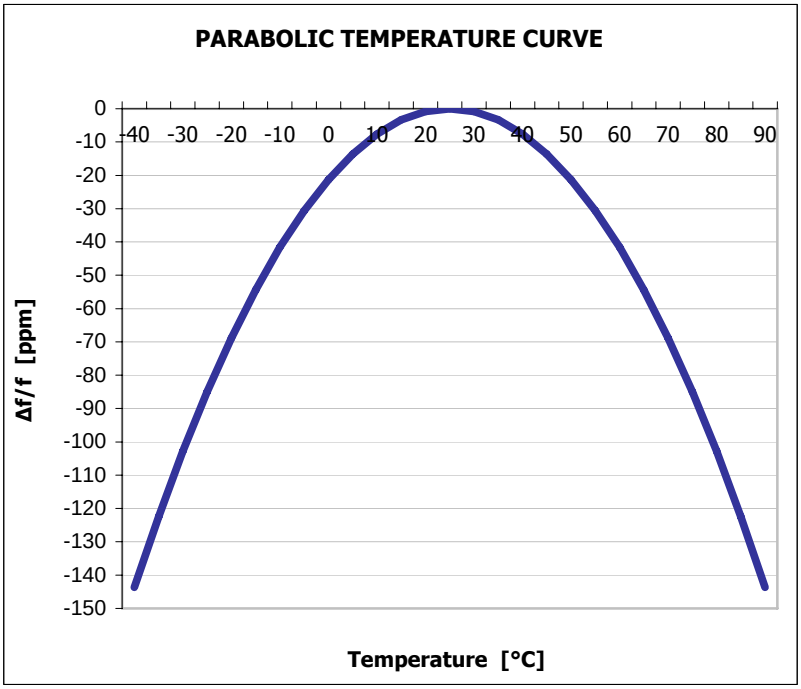
PACKAGING INFORMATION [reference]
Device quantity is 1k pcs. maximum 180mm reel and 3k pcs. maximum 330mm reel.



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		-	-	50	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, Δf = Temperature Coefficent$(T_A-T_M)^2$.

Ex. Find frequency stability at T_A = 45°C

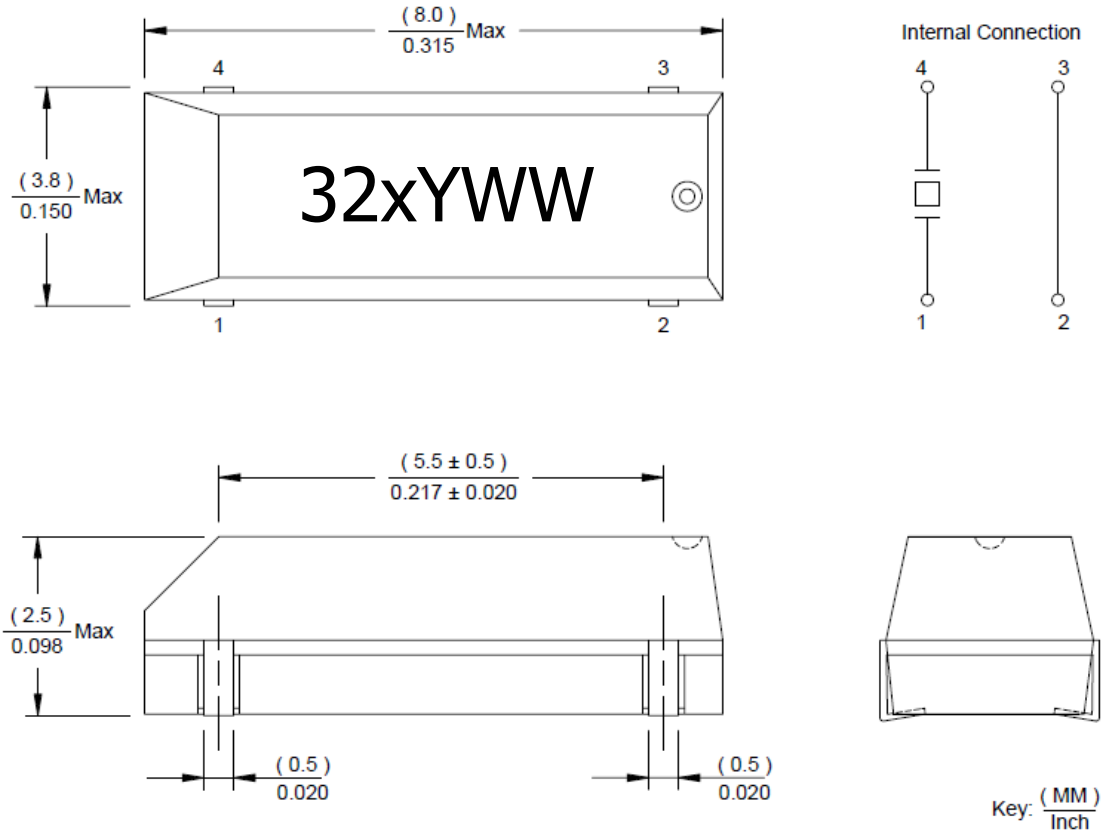
$\Delta f = -0.034(45-25)^2$

$\Delta f = -0.034(20)^2$

$\Delta f = -13.6$ ppm

MECHANICAL SPECIFICATIONS

PACKAGE DRAWING



MARKING INFORMATION

1. 32 – Frequency, 32.7680kHz.
2. x – Load Capacitance.
   P = 12.5pF
   T = 6pF
3. YWW – Date Code.
   Y = year
   WW = week

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