

## Tuning Fork Crystal



### FEATURES

- Miniature package
- Low cost
- kHz frequency
- Tight tolerance
- Compliant to RoHS directive 2002/95/EC

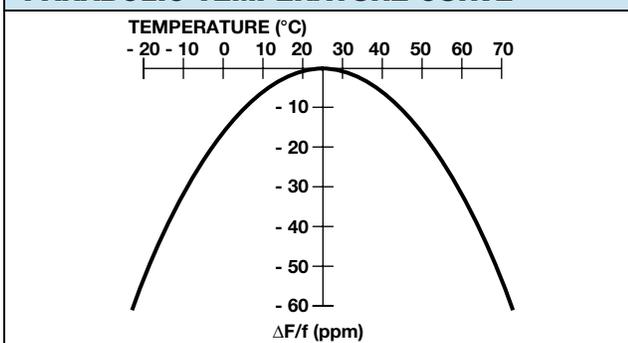

**RoHS**  
COMPLIANT

The tuning fork type quartz crystal provides ultimate in size, performance and economic trade-offs. So it is used as a clock source in communication equipment, measuring instrument, microprocessor and other time management applications.

### STANDARD ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Frequency range	$F_O$		kHz	-	32.768	-
Frequency tolerance	$\Delta F/F_O$	at 25 °C	ppm	-	$\pm 20$	-
Frequency coefficient	K	ref. to 25 °C	ppm/( $\Delta^\circ\text{C}$ ) <sup>2</sup>	-	-	- 0.042
Operating temperature range	$T_{OPR}$		°C	- 10	-	+ 60
Storage temperature range	$T_{STG}$		°C	- 20	-	+ 70
Shunt capacitance	$C_0$		pF	-	0.85	2
Motional capacitance	$C_1$		fF	1	2	4
Load capacitance	$C_L$	customer specified	pF	-	12.5	-
Insulation resistance	$I_R$	100 V <sub>DC</sub>	M $\Omega$	500	-	-
Drive level	$D_L$		$\mu\text{W}$	-	-	1
Aging (first year)	Fa	at 25 °C $\pm$ 3 °C	ppm	- 5	-	+ 5
Equation series resistance (ESR)	$R_s$		k $\Omega$	-	-	35

### PARABOLIC TEMPERATURE CURVE

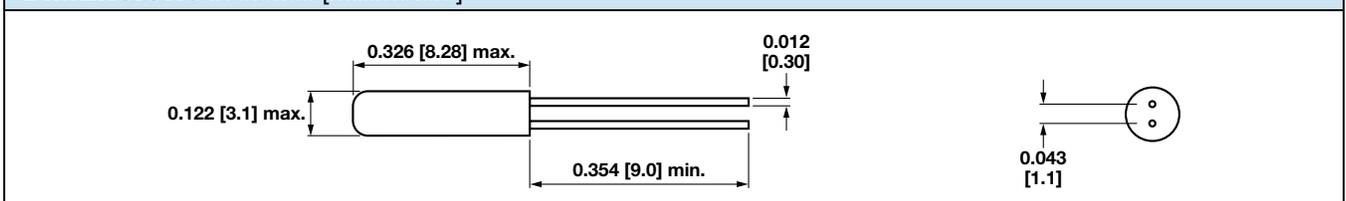


To determine frequency stability, use parabolic curvature (k).

For example: What is stability at 45 °C?

1. Change in temperature (°C) = 45 °C - 25 °C = 20 °C
2. Change in frequency = - 0.042 ppm x ( $\Delta^\circ\text{C}$ )  
 = - 0.042 ppm x (20)<sup>2</sup>  
 = - 16.8 ppm (max.)

### DIMENSIONS in inches [millimeters]



## ORDERING INFORMATION

XT38T MODEL	32.768 kHz FREQUENCY/kHz	e2 JEDEC LEAD (Pb)-FREE STANDARD
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## GLOBAL PART NUMBER

X	T	3	8	T	T	A	3	2	K	7	6	8
MODEL					OPERATING TEMPERATURE	PACKAGE CODE	FREQUENCY					

## GLOBAL PART NUMBERING

X	T	9	S	2	0	A	N	A	4	0	M
<b>MODEL NUMBER</b>				<b>LOAD CAPACITANCE</b>		<b>PACKAGE CODE</b>	<b>OPTIONS</b>		<b>FREQUENCY</b>		
XT9S = XT49S XT9M = XT49M XTU1 = XTUM1				18 = 18 pF 20 = 20 pF NL = series to be specified by customer		<b>Tape and reel</b> G = RF5 (XT9S) H = RF7 (XT9M)  <b>Bulk</b> A = B04 (all models)	NA = no additional options RR = extended temperature of - 40 °C to + 85 °C Contact factory for all other options		4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency		
Example: XT49S-20 40M											
X	T	3	6	2	0	A	1	2	M		
<b>MODEL NUMBER</b>				<b>LOAD CAPACITANCE</b>		<b>PACKAGE CODE</b>	<b>FREQUENCY</b>				
XT46 = XT46C XT36 = XT36C				18 = 18 pF 20 = 20 pF NL = series to be specified by customer		<b>Tape and reel</b> H = RF7  <b>Bulk</b> A = B04 (all models)	4M = 4 MHz 40M = 40 MHz 100M = 100 MHz 12M288 = 12.288 MHz M is used as decimal place holder in frequency				
Example: XT36C-20 12M											



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