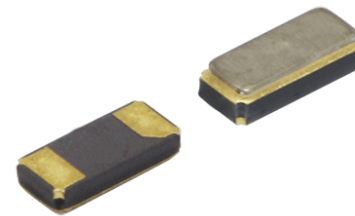


TFA32 Series

Automotive Grade Tuning Fork Crystal

Features

- AEC-Q200 Compliant
- Hermetic Ceramic Surface Mount Package
- Tuning Fork Crystal Design
- 32.7680kHz Frequency Reference
- Frequency Tolerance, ± 20 ppm Standard
- Parabolic Temperature Coefficient
- Tape and Reel Packaging, EIA-418



Part Dimensions:
3.2 x 1.5 x 0.9mm • 12.1467mg

Applications

- Automotive Electronics
- Car Navigation Systems
- Car Infotainment Systems
- Industrial Control Equipment
- M2M Communications
- FPGAs & Microcontrollers

Description

CTS TFA32 Series is ideal for supporting wide range of electronic designs requiring a Real Time Clock reference. This series will support general automotive and industrial applications.

Ordering Information

Model	Frequency Tolerance	Load Capacitance	Temperature Range	Frequency Code [kHz]	Packaging																				
TF A32	2	P	I	327K	R																				
<table border="1"> <thead> <tr> <th>Code</th> <th>Package</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Automotive</td> </tr> <tr> <td>32</td> <td>3.2x1.5mm</td> </tr> </tbody> </table>		Code	Package	A	Automotive	32	3.2x1.5mm	<table border="1"> <thead> <tr> <th>Code</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>12.5pF</td> </tr> <tr> <td>J</td> <td>9pF</td> </tr> <tr> <td>V</td> <td>7pF</td> </tr> <tr> <td>T</td> <td>6pF</td> </tr> </tbody> </table>		Code	Capacitance	P	12.5pF	J	9pF	V	7pF	T	6pF	<table border="1"> <thead> <tr> <th>Code</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td colspan="2">Frequency = 32.7680kHz</td> </tr> </tbody> </table>		Code	Frequency	Frequency = 32.7680kHz	
Code	Package																								
A	Automotive																								
32	3.2x1.5mm																								
Code	Capacitance																								
P	12.5pF																								
J	9pF																								
V	7pF																								
T	6pF																								
Code	Frequency																								
Frequency = 32.7680kHz																									
<table border="1"> <thead> <tr> <th>Code</th> <th>@ +25°C</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>± 20ppm</td> </tr> <tr> <td>1</td> <td>± 10ppm</td> </tr> </tbody> </table>		Code	@ +25°C	2	± 20 ppm	1	± 10 ppm	<table border="1"> <thead> <tr> <th>Code</th> <th>Temp. Range</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>-40°C to +85°C</td> </tr> <tr> <td>G</td> <td>-40°C to +105°C</td> </tr> <tr> <td>H</td> <td>-40°C to +125°C¹</td> </tr> </tbody> </table>		Code	Temp. Range	I	-40°C to +85°C	G	-40°C to +105°C	H	-40°C to +125°C ¹	<table border="1"> <thead> <tr> <th>Code</th> <th>Packing</th> </tr> </thead> <tbody> <tr> <td>R</td> <td>3k pcs./reel</td> </tr> </tbody> </table>		Code	Packing	R	3k pcs./reel		
Code	@ +25°C																								
2	± 20 ppm																								
1	± 10 ppm																								
Code	Temp. Range																								
I	-40°C to +85°C																								
G	-40°C to +105°C																								
H	-40°C to +125°C ¹																								
Code	Packing																								
R	3k pcs./reel																								

Notes:

1] Check with factory for availability.

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

This product is specified for use only in standard commercial applications. Supplier disclaims all express and implied warranties and liability in connection with any use of this product in any non-commercial applications or in any application that may expose the product to conditions that are outside of the tolerances provided in its specification.

Electrical Specifications

Operating Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Temperature	T _A	-	-40	+25	+105	°C
Turnover Temperature	T _M	-	+20	+25	+30	°C
Storage Temperature	T _{STG}	-	-55	-	+125	°C

Frequency Stability

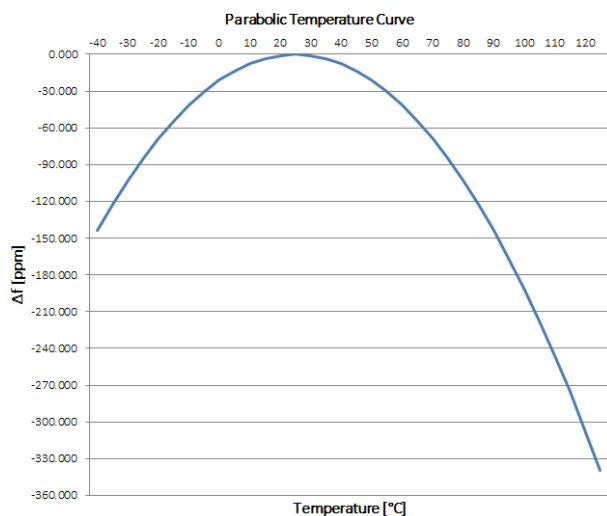
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency	f ₀	-		32.7680		kHz
Frequency Tolerance [Note 1]	Δf/f ₀	Standard @ +25°C	-20	-	20	ppm
Parabolic Coefficient	β	See Figure 1		-0.034 ±0.010		ppm/°C ²
Aging	Δf/f ₀	First Year @ +25°C	-3	-	3	ppm

Crystal Parameters

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Mode	-	-		Flexural Mode [Tuning Fork]		-
Load Capacitance [Note 1]	C _L	Standard	-	12.5	-	pF
Shunt Capacitance	C ₀	-	-	1.2	-	pF
Motional Capacitance	C ₁	-	-	3.4	-	fF
Series Resistance	R ₁	-	-	-	70	kΩ
Drive Level	DL	-	-	0.5	1.0	μW
Insulation Resistance	R _i	+100Vdc ±15Vdc	500	-	-	MΩ

1.] See Ordering Information for available options.

Figure 1



Frequency Stability [Δf] at a given temperature,

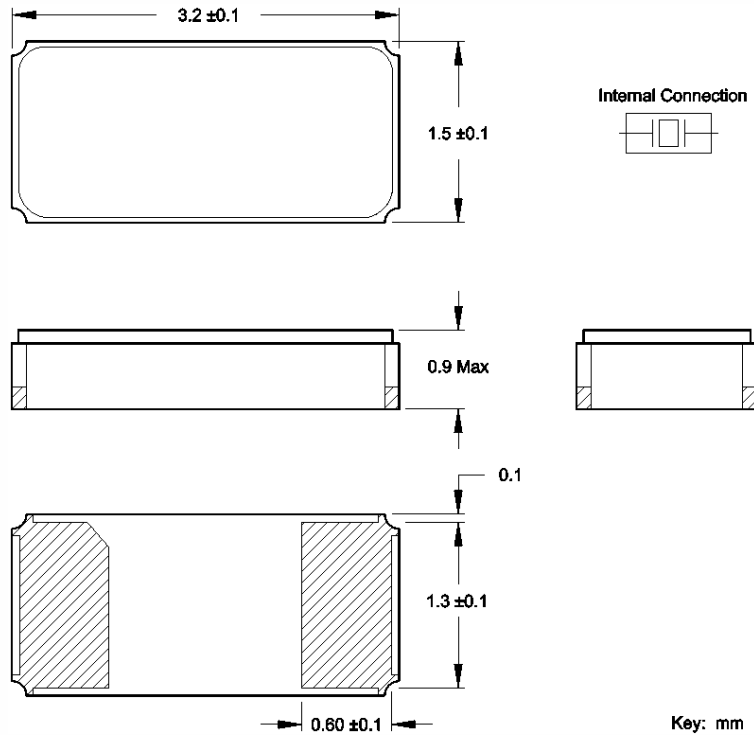
$$\Delta f = \beta [T_A - T_M]^2$$

β = Parabolic Coefficient
T_A = Ambient Temperature
T_M = Turnover Temperature

Ex. Find frequency stability at T_A = +60°C
 $\Delta f = -0.034[60-25]^2$
 $\Delta f = -0.034[35]^2$
 $\Delta f = -41.65\text{ppm}$

Mechanical Specifications

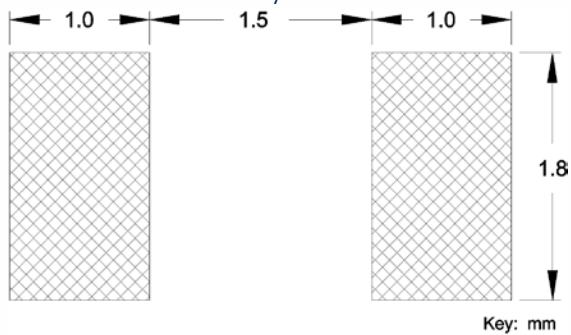
Package Drawing



Marking Information

Contact factory for marking formats that apply to this model series.

Recommended Pad Layout

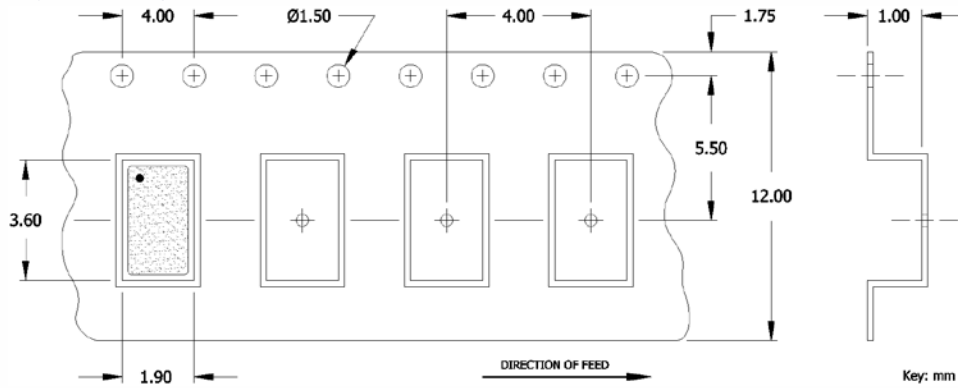


Notes

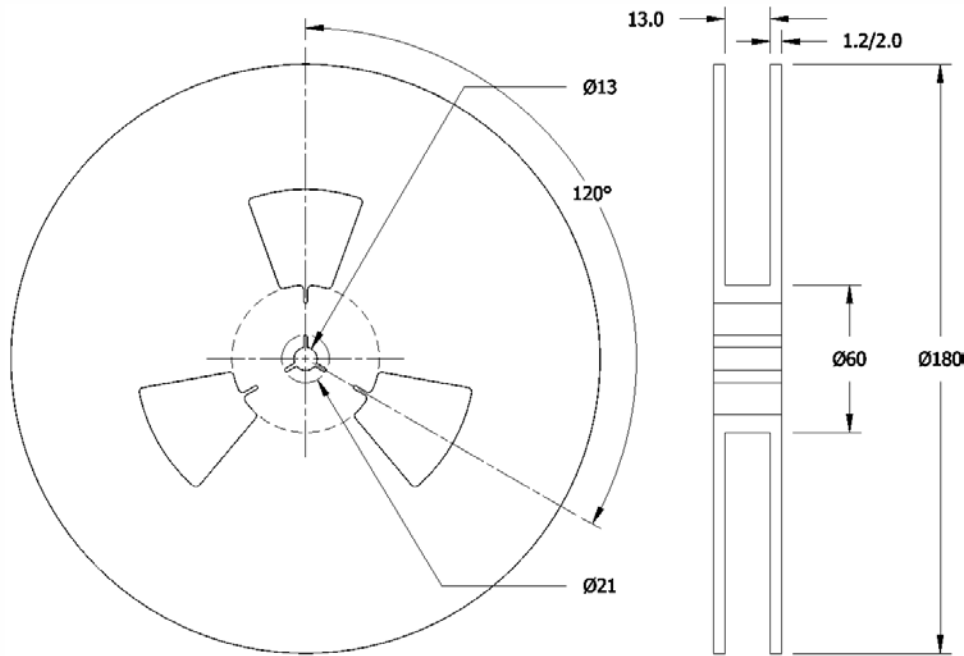
1. JEDEC termination code (e4). Barrier-plating is nickel [Ni] with gold [Au] flash plate.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.
4. Due to the large world-wide production volumes for this model series, product variability may exist between production date codes, such as package coloring and product marking format. CTS guarantees form-fit-function performance to published data sheet parameters. Contact your local CTS Representative or CTS Customer Service with specific questions.

Packaging - Tape and Reel

Tape Drawing



Reel Drawing



Notes

1. Device quantity is 3k pieces maximum per 180mm reel.
2. Complete CTS part number, frequency value, date code and manufacturing site code information must appear on reel and carton labels.