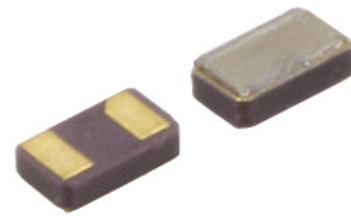


# TFA20 Series

## Automotive Grade Tuning Fork Crystal



Part Dimensions:  
2.0 × 1.2 × 0.6mm • 4.5926mg

### Features

- AEC-Q200 Compliant
- Hermetic Ceramic Surface Mount Package
- Tuning Fork Crystal Design
- 32.7680kHz Frequency Reference
- Frequency Tolerance, ±20ppm Standard
- Parabolic Temperature Coefficient
- Tape and Reel Packaging, EIA-481

### Applications

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

### Description

CTS TFA20 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	A20	2	P	I	327K	R																																	
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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 <sub>A</sub>	-	-40		+85	°C
			-40	+25	+105	
			-40		+125	
Turnover Temperature	T <sub>M</sub>	-	+20	+25	+30	°C
Storage Temperature	T <sub>STG</sub>	-	-55	-	+125	°C

### Frequency Stability

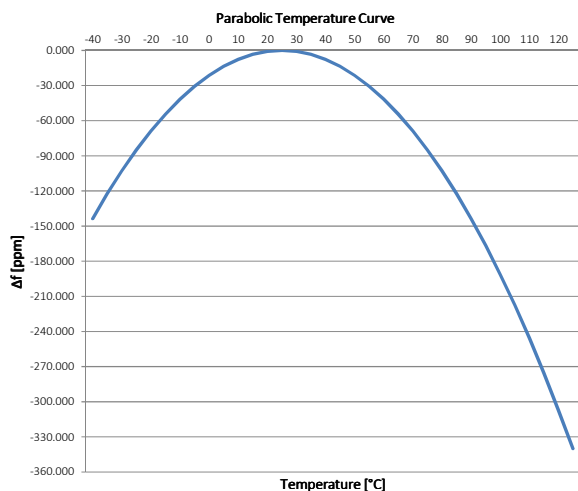
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency	f <sub>0</sub>	-		32.7680		kHz
Frequency Tolerance [Note 1]	Δf/f <sub>0</sub>	Standard @ +25°C	-20	-	20	ppm
Parabolic Coefficient	β	See Figure 1		-0.034 ±0.010		ppm/°C <sup>2</sup>
Aging	Δf/f <sub>0</sub>	First Year @ +25°C	-3	-	3	ppm

### Crystal Parameters

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Mode	-	-		Flexural Mode [Tuning Fork]		-
Load Capacitance [Note 1]	C <sub>L</sub>	Standard	-	12.5	-	pF
Shunt Capacitance	C <sub>0</sub>	-	-	1.3	-	pF
Motional Capacitance	C <sub>1</sub>	-	-	6.5	-	fF
Series Resistance	R <sub>1</sub>	-	-	-	90	kΩ
Drive Level	DL	-	-	0.1	0.5	μW
Insulation Resistance	R <sub>i</sub>	+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<sub>A</sub> = Ambient Temperature  
T<sub>M</sub> = Turnover Temperature

Ex. Find frequency stability at T<sub>A</sub> = +60°C

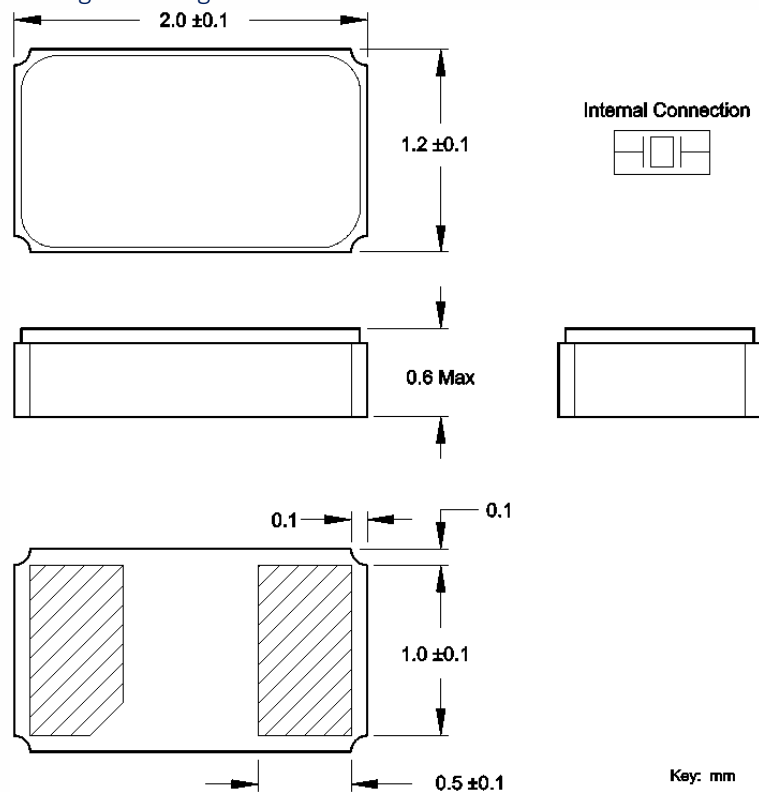
$$\Delta f = -0.034 [60 - 25]^2$$

$$\Delta f = -0.034 [35]^2$$

$$\Delta f = -41.65 \text{ ppm}$$

### Mechanical Specifications

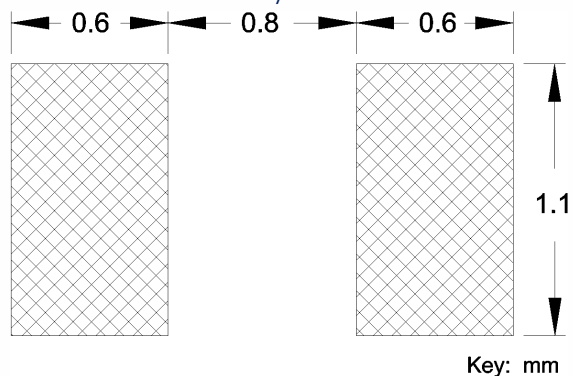
Package Drawing



### Marking Information

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

Recommended Pad Layout

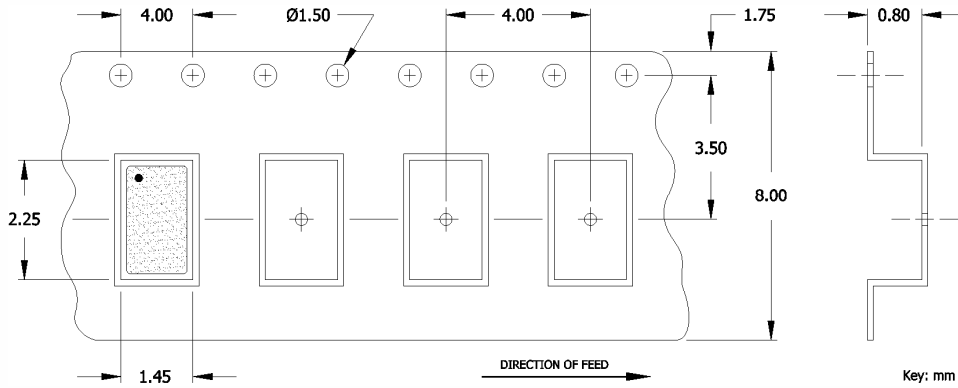


### Notes

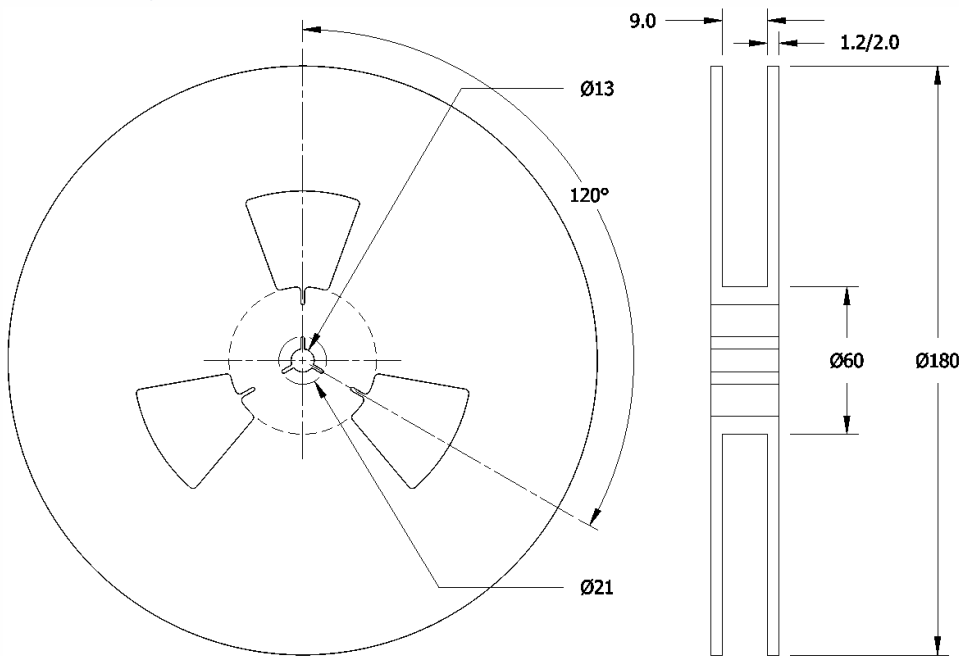
1. JEDEC termination code (e4). Barrier-plating is nickel [Ni] with gold [Au] flash plate.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.
4. Due to the large world-wide production volumes for this model series, product variability may exist between production date codes, 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.