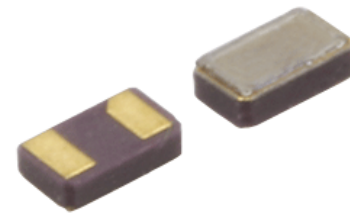


TFE20 Series

Low ESR Tuning Fork Crystal

Features

- 32.7680kHz Frequency Reference
- Low ESR Tuning Fork Crystal Design, <50k Ohms
- Hermetic Ceramic Surface Mount Package
- Ideal for High Density Circuit Boards
- Frequency Tolerance, ± 20 ppm Standard
- Parabolic Temperature Coefficient
- Tape and Reel Packaging, EIA-418



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

Applications

- Real Time Clock Reference
- Low Power FPGAs & MCUs
- Wearable Electronics
- Healthcare Devices
- Battery Powered Applications
- Portable Electronics
- Data Loggers
- Smart Meters

Description

CTS TFE20 Series is designed to pair with low power microcontrollers requiring a Real Time Clock reference with an ESR of 50k Ohms maximum. This series will support general commercial and industrial applications.

Ordering Information

| Model | | Frequency Tolerance | Load Capacitance | Frequency Code [kHz] | Packaging |
|--------------|--------------|-------------------------------------|------------------|----------------------|--------------|
| TF | E20 | 2 | P | 32K7680 | R |
| Code Package | | Code Capacitance | | Code Packing | |
| E | Low ESR | P | 12.5pF | R | 3k pcs./reel |
| 20 | 2.0x1.2mm | J | 9pF | | |
| | | V | 7pF | | |
| | | W | 5pF | | |
| Code @ +25°C | | Code Frequency | | | |
| 2 | ± 20 ppm | Product Frequency Code ¹ | | | |
| 1 | ± 10 ppm | | | | |

Notes:

- 1] 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.**

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 | +85 | °C |
| Turnover Temperature | T_M | - | +20 | +25 | +30 | °C |
| Storage Temperature | T_{STG} | - | -55 | - | +125 | °C |

Frequency Stability

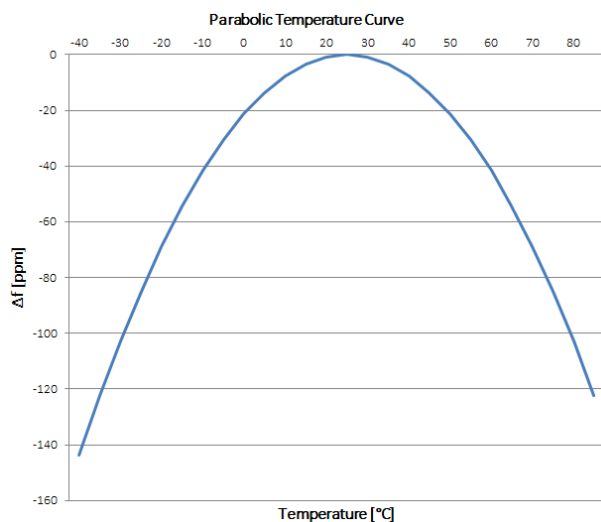
| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------------|----------------|--------------------|-----|---------------|-----|---------------------|
| Frequency | f_0 | - | | 32.7680 | | kHz |
| Frequency Tolerance [Note 1] | $\Delta f/f_0$ | Standard @ +25°C | -20 | - | 20 | ppm |
| Parabolic Coefficient | β | See Figure 1 | | -0.034 ±0.006 | | ppm/°C ² |
| Aging | $\Delta f/f_0$ | 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 | - | - | 1.8 | - | pF |
| Motional Capacitance | C_1 | - | - | 9.5 | - | fF |
| Series Resistance | R_1 | - | - | - | 50 | kΩ |
| Drive Level | DL | - | - | 0.1 | 0.5 | 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 $T_A = +45^\circ\text{C}$

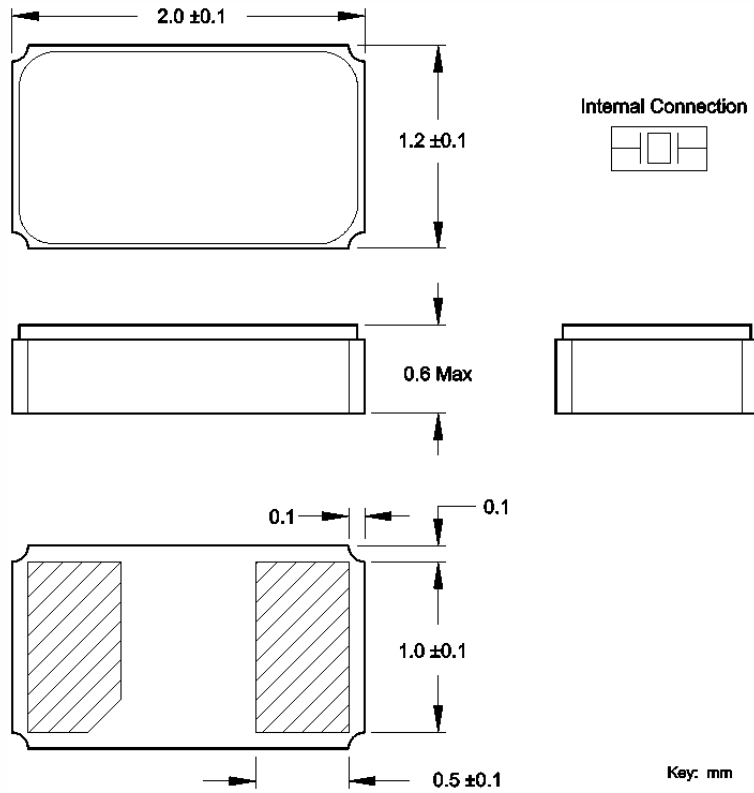
$$\Delta f = -0.034[45-25]^2$$

$$\Delta f = -0.034[20]^2$$

$$\Delta f = -13.6\text{ppm}$$

Mechanical Specifications

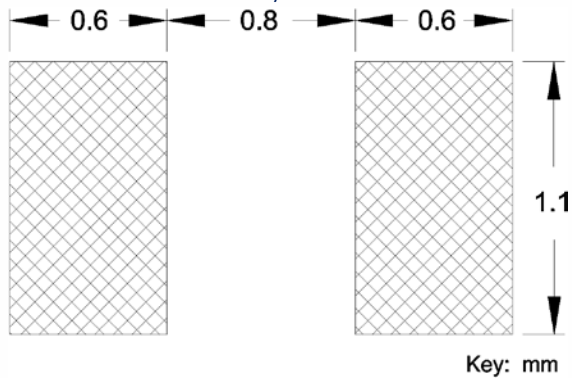
Package Drawing



Marking Information

Refer to document 016-0071-0, TF Marking Guide, for marking format by product family.

Recommended Pad Layout

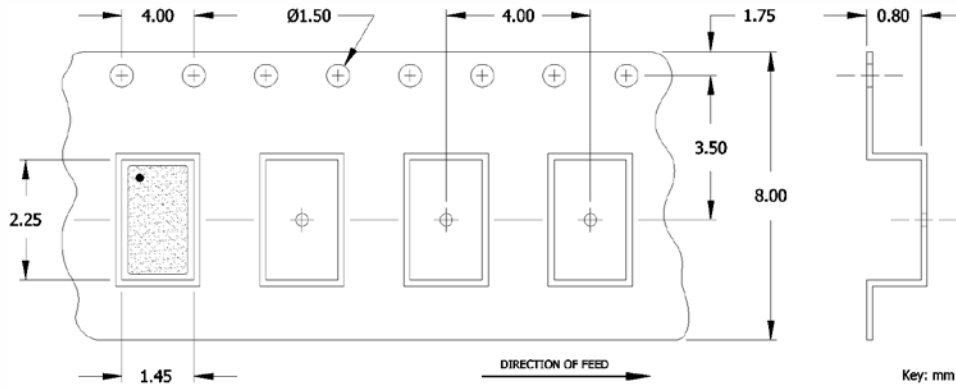


Notes

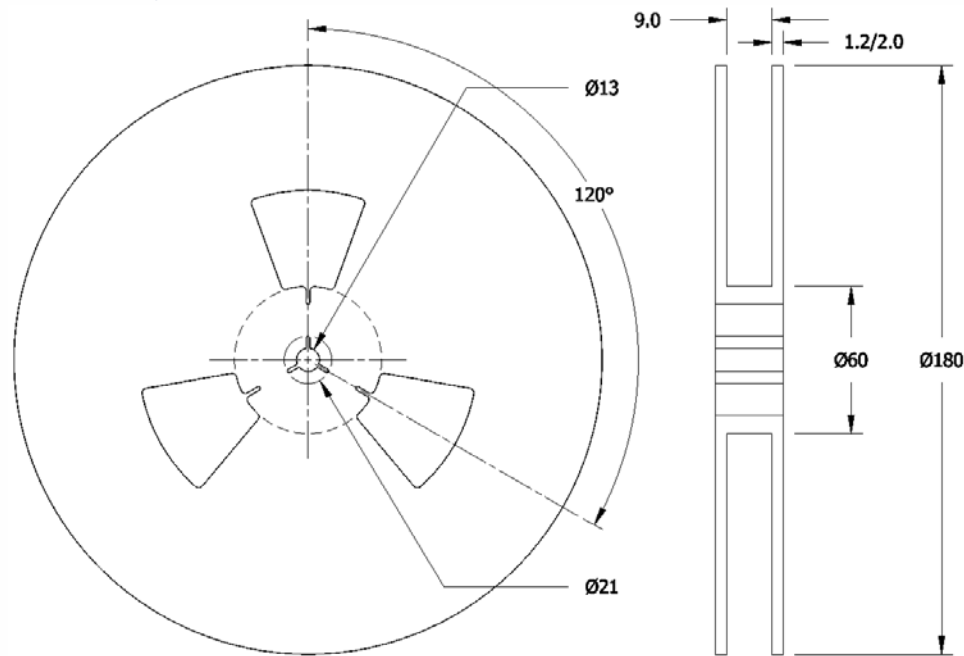
1. JEDEC termination code (e4). Barrier-plating is nickel [Ni] with gold [Au] flash plate.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.

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.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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