

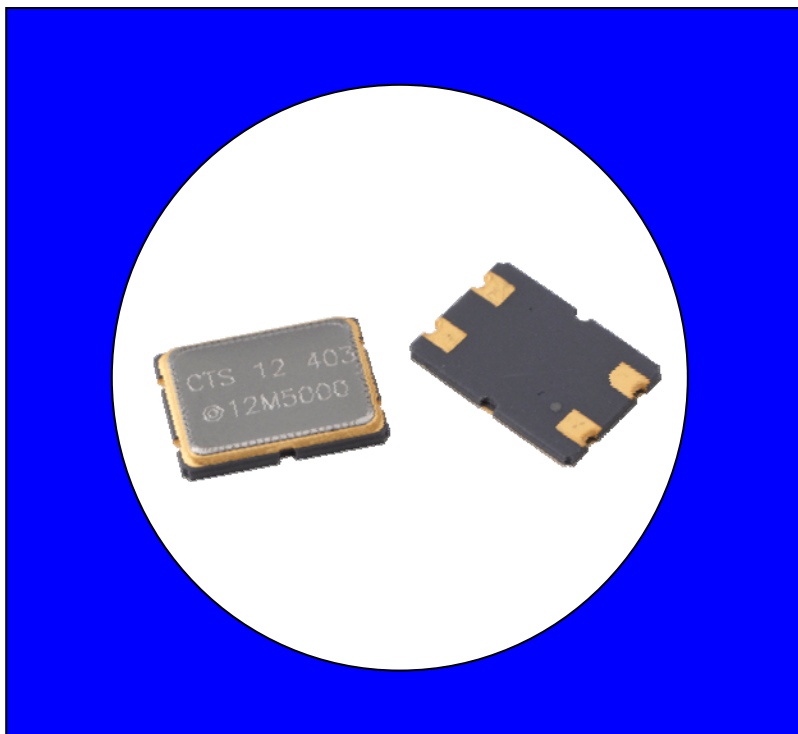


### FEATURES

- Standard 7.0x5.0mm Surface Mount Footprint
- Stable Frequency Over Temperature and Drive Level
- Frequency Range 6 – 156.25 MHz
- Frequency Tolerance,  $\pm 30$  ppm Standard ( $\pm 10$  ppm,  $\pm 15$  ppm and  $\pm 20$  ppm available)
- Frequency Stability,  $\pm 50$  ppm Standard ( $\pm 10, \pm 15, \pm 20, \pm 30$  and  $\pm 40$  ppm available)
- Operating Temperature to  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Tape & Reel Packaging, EIA-481-2 Compliant
- **RoHS/Green Compliant (6/6)**

### DESCRIPTION

The Model 407 is a ceramic packaged Crystal offering reduced size, ideal for high-density circuit board applications. The Model 407 offers reliable precision and excellent shock performance in wireless telecommunication devices.



### ORDERING INFORMATION

407 □ □ □ □ □ □ □ M □ □ □ □

| MODE OF OSCILLATION          |
|------------------------------|
| F = Fundamental              |
| T = 3 <sup>RD</sup> Overtone |

| FREQUENCY TOLERANCE @ 25°C  |
|-----------------------------|
| 1 = $\pm 10$ ppm            |
| X = $\pm 15$ ppm            |
| 2 = $\pm 20$ ppm            |
| 3 = $\pm 30$ ppm (standard) |

| STABILITY TOLERANCE/TEMPERATURE RANGE                                       |
|-----------------------------------------------------------------------------|
| Over Operating Temperature Range<br>(Referenced to 25°C Reading)            |
| 1 = $\pm 10$ ppm, $-20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$            |
| X = $\pm 15$ ppm, $-20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$            |
| 2 = $\pm 20$ ppm, $-20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$            |
| 3 = $\pm 30$ ppm, $-20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$            |
| 4 = $\pm 40$ ppm, $-20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$            |
| 5 = $\pm 50$ ppm, $-20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ (standard) |
| W = $\pm 15$ ppm, $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$            |
| 6 = $\pm 20$ ppm, $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$            |
| 7 = $\pm 30$ ppm, $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$            |
| 8 = $\pm 40$ ppm, $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$            |
| 9 = $\pm 50$ ppm, $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$            |

| FREQUENCY IN MHz                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------|
| M - indicates MHz and decimal point.<br>Frequency is recorded with minimum 4 significant digits to the right of the "M". |

| LOAD CAPACITANCE |            |
|------------------|------------|
| A = 10 pF        | G = 30 pF  |
| B = 13 pF        | H = 32 pF  |
| C = 16 pF        | J = 9 pF   |
| D = 18 pF        | K = 8 pF   |
| E = 20 pF        | L = 12 pF  |
| F = 24 pF        | S = Series |

Example Part Numbers:  
407F35A014M3181 ( $F_0 = 14.31818$  MHz)  
407T39A050M0000

Custom performance characteristics are available upon request.  
Use form C052 to detail non-standard parameters.

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

## ELECTRICAL CHARACTERISTICS

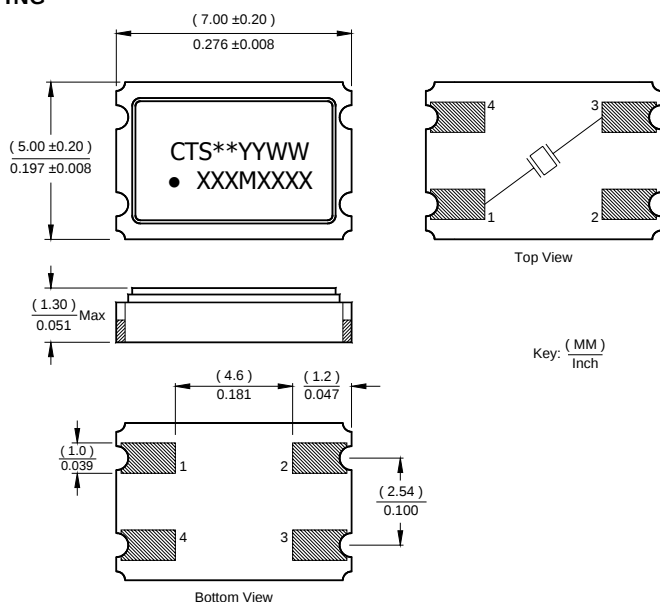
|                       | PARAMETER                                                                                  | VALUE                                                                               |
|-----------------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Electrical Parameters | Operating Mode (Note 1)                                                                    | Fundamental or 3 <sup>RD</sup> Overtone                                             |
|                       | Crystal Cut                                                                                | AT-Cut                                                                              |
|                       | Frequency Range                                                                            | 6.0 MHz to 156.25 MHz                                                               |
|                       | Frequency Tolerance @ 25°C                                                                 | ± 30 ppm Standard<br>(± 10 ppm, ±15 ppm and ± 20 ppm Available)                     |
|                       | Frequency Stability Tolerance<br>(Operating Temperature Range, Referenced to 25°C Reading) | ± 50 ppm Standard<br>(± 10 ppm, ±15 ppm, ± 20 ppm, ± 30 ppm and ± 40 ppm Available) |
|                       | Operating Temperature Range                                                                | -20°C to +70°C Standard<br>(-40°C to +85°C Available)                               |
|                       | Storage Temperature Range                                                                  | -55°C to +125°C                                                                     |
|                       | Equivalent Series Resistance                                                               | See ESR Table                                                                       |
|                       | Load Capacitance or Resonance Mode                                                         | See Ordering Information                                                            |
|                       | Shunt Capacitance (C <sub>0</sub> )                                                        | 7.0 pF Maximum                                                                      |
|                       | Drive Level                                                                                | 25 µW Typical, 100 µW Maximum                                                       |
|                       | Aging @ 25°C                                                                               | ± 3 ppm/year maximum                                                                |
|                       | Reflow Condition, per JEDEC J-STD-020                                                      | +255°C ± 5°C, 10 Seconds Maximum                                                    |

## EQUIVALENT SERIES RESISTANCE TABLE

| FREQUENCY RANGE             | MODE of OSCILLATION      | ESR Maximum |
|-----------------------------|--------------------------|-------------|
| 6.000 MHz - 7.999 MHz       | Fundamental              | 80 Ohms     |
| 8.000 MHz - 15.999 MHz      | Fundamental              | 60 Ohms     |
| 16.000 MHz - 50.000 MHz     | Fundamental              | 40 Ohms     |
| 30.001 MHz - 60.000 MHz     | 3 <sup>RD</sup> Overtone | 100 Ohms    |
| 60.001 MHz - 156.25.000 MHz | 3 <sup>RD</sup> Overtone | 80 Ohms     |

## MECHANICAL SPECIFICATIONS

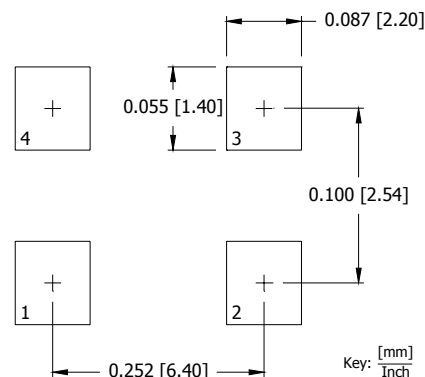
### PACKAGE DRAWING



### MARKING INFORMATION

1. \*\* - Manufacturing Site Code.
2. YYWW – Date Code, YY – Year, WW – Week.
3. XXXMXXX – Frequency marked with 4 significant digits after the 'M'.
4. Complete CTS part number, frequency value and date code information must appear on reel and box labels.

### SUGGESTED SOLDER PAD GEOMETRY

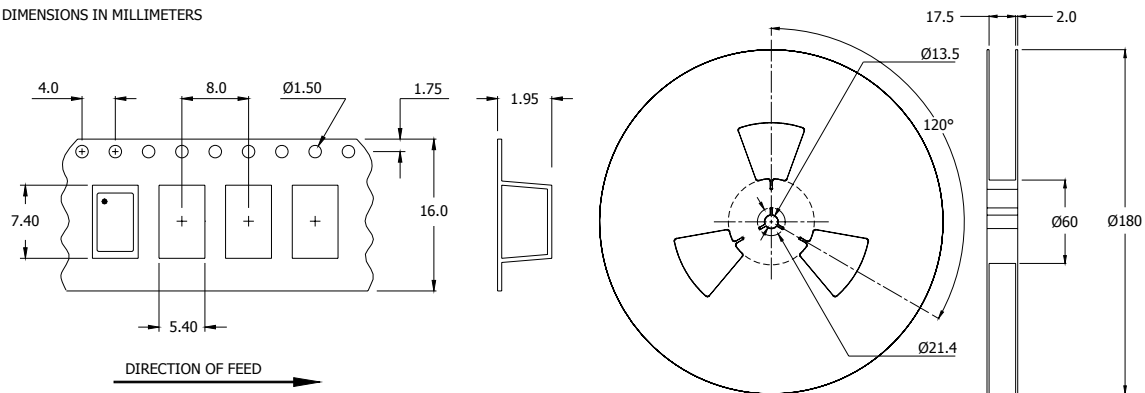


### Notes:

1. Termination pads (e4), barrier-plating is nickel (Ni) with gold (Au) flash plate.
2. Terminations #2, #4 and the metal lid are connected internally.  
End user may connect these pins to circuit ground.

## TAPE AND REEL INFORMATION

DIMENSIONS IN MILLIMETERS



Device quantity is 1,000 pieces per 180mm reel.

## ENVIRONMENTAL SPECIFICATIONS

|                                  |                                                                                                                                                     |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Cycle:               | 400 cycles from $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ , 10 minute dwell at each temperature, 1 minute transfer time between temperatures. |
| Mechanical Shock:                | 1,500g's, 0.5mS duration, $\frac{1}{2}$ sinewave, 3 shocks each direction along 3 mutually perpendicular planes (18 total shocks).                  |
| Sinusoidal Vibration:            | 0.06 inches double amplitude, 10 to 55 Hz and 20g's, 55 to 2,000 Hz, 3 cycles each in 3 mutually perpendicular planes (9 times total).              |
| Gross Leak:                      | No leak shall appear while immersed in an FC40 or equivalent liquid at $+125^{\circ}\text{C}$ for 20 seconds.                                       |
| Fine Leak:                       | Mass spectrometer leak rates less than $2 \times 10^{-8}$ ATM cc/sec air equivalent.                                                                |
| Resistance to Solder Heat:       | Product must survive 3 reflows of $+260^{\circ}\text{C}$ peak, 10 seconds maximum.                                                                  |
| High Temperature Operating Bias: | 2,000 hours at $+125^{\circ}\text{C}$ , disregarding frequency shift.                                                                               |
| Frequency Aging:                 | 1,000 hours at $+85^{\circ}\text{C}$ , maximum $\pm 5$ ppm shift.                                                                                   |
| Insulation Resistance:           | 500M Ohms @ $100\text{V}_{\text{DC}} \pm 15\text{V}_{\text{DC}}$ .                                                                                  |
| Moisture Sensitivity Level:      | Level 1 per JEDEC J-STD-020.                                                                                                                        |



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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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