



FEATURES

- Standard 2.5x2.0mm Surface Mount Footprint
- Stable Frequency Over Temperature and Drive Level
- **Fundamental Crystal Design**
- Frequency Range 16 – 54 MHz
- Frequency Tolerance, ± 30 ppm Standard (± 10 ppm, ± 15 ppm and ± 20 ppm available)
- Frequency Stability, ± 50 ppm Standard ($\pm 10, \pm 20, \pm 30$ and ± 40 ppm available)
- Operating Temperature to -40°C to $+85^{\circ}\text{C}$
- Tape & Reel Packaging, EIA-481-2 Compliant
- **RoHS/Green Compliant (6/6)**

DESCRIPTION

The Model 425 is a ceramic packaged Crystal offering reduced size, ideal for high-density circuit board applications. The Model 425 offers reliable precision and excellent shock performance in wireless telecommunication devices.



ORDERING INFORMATION

425 □ □ □ □ □ □ □ M □ □ □ □

| MODE OF OSCILLATION |
|---------------------|
| F = Fundamental |

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

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

| FREQUENCY IN MHz |
|--|
| M - indicates MHz and decimal point. 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:
425F35E014M3181
425FX9A050M0000

Custom performance characteristics are available upon request. Use form C052 to detail non-standard parameters.
Contact your local CTS Representative or CTS Customer Service for assistance.

ELECTRICAL CHARACTERISTICS

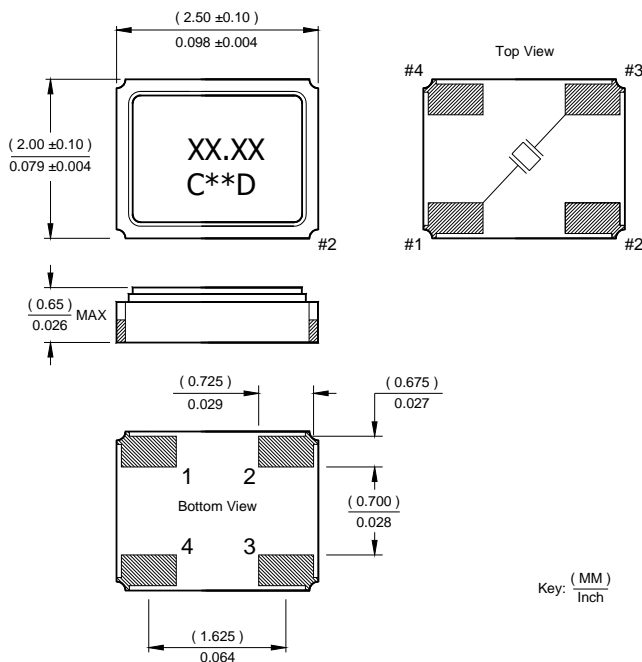
| | PARAMETER | VALUE |
|-----------------------|--|--|
| Electrical Parameters | Operating Mode | Fundamental |
| | Crystal Cut | AT-Cut |
| | Frequency Range | 16.0 MHz to 54.0 MHz |
| | Frequency Tolerance @ 25°C | ± 30 ppm Standard (± 10 ppm, ±15 ppm and ± 20 ppm Available) |
| | Frequency Stability Tolerance (Operating Temperature Range, Referenced to 25°C Reading) | ± 50 ppm Standard (± 10 ppm, ± 20 ppm, ± 30 ppm and ± 40 ppm Available) |
| | Operating Temperature Range | -20°C to +70°C Standard (-40°C to +85°C Available) |
| | Storage Temperature Range | -40°C to +85°C |
| | Equivalent Series Resistance | See ESR Table |
| | Load Capacitance or Resonance Mode | See Ordering Information |
| | Shunt Capacitance (C ₀) | 5.0 pF Maximum |
| | Drive Level | 10 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 |
|------------------------|---------------------|-------------|
| 16.00 MHz - 19.999 MHz | Fundamental | 120 Ohms |
| 20.00 MHz - 29.999 MHz | Fundamental | 100 Ohms |
| 30.00 MHz - 54.000 MHz | Fundamental | 60 Ohms |

MECHANICAL SPECIFICATIONS

PACKAGE DRAWING



MARKING INFORMATION

1. XX.XX – Frequency in MHz.
2. C – CTS and Pin 1 identifier.
3. ** – Manufacturing Site Code.
4. D – Manufactured Date Code. See Table I for codes.
5. Complete CTS part number, frequency value and date code information must appear on reel and box labels.

SUGGESTED SOLDER PAD GEOMETRY



Notes:

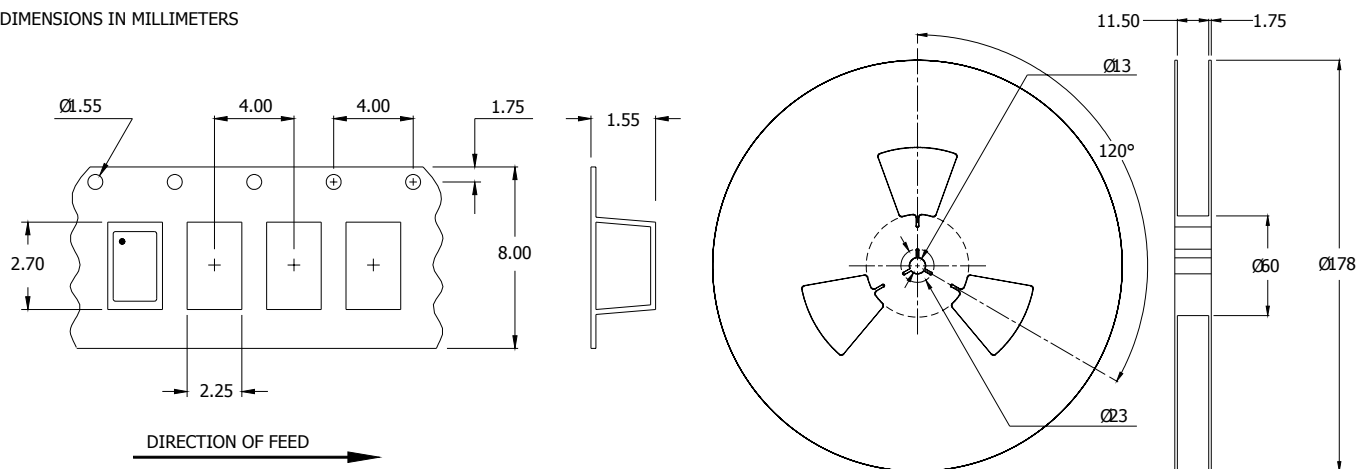
1. Termination pads (e4), barrier-plating is nickel (Ni) with gold (Au) flash plate.
2. Terminations #2, #4 and the metal lid are connected internally. End user may connect these pins to circuit ground.

TABLE I

| YEAR | | | | | MONTH | | | | | | | | | | | |
|------|------|------|------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | | | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 2001 | 2005 | 2009 | 2013 | 2017 | A | B | C | D | E | F | G | H | J | K | L | M |
| 2002 | 2006 | 2010 | 2014 | 2018 | N | P | Q | R | S | T | U | V | W | X | Y | Z |
| 2003 | 2007 | 2011 | 2015 | 2019 | a | b | c | d | e | f | g | h | j | k | l | m |
| 2004 | 2008 | 2012 | 2016 | 2020 | n | p | q | r | s | t | u | v | w | x | y | z |

TAPE AND REEL INFORMATION

DIMENSIONS IN MILLIMETERS



Device quantity is 3,000 pieces minimum per 178mm reel.

ENVIRONMENTAL SPECIFICATIONS

| | |
|----------------------------------|---|
| Temperature Cycle: | 400 cycles from -55°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, 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 2×10^{-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 ± 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. |

QUALITY AND RELIABILITY

Quality systems meet or exceed the requirements of ISO 9000:2000 standards.