# CARDINAL COMPONENTS

# CX635A Series
# Miniature SMD Crystal

CX635A
6.0 x 3.5 x 1.0 mm
Ceramic Package

## Features

- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel Packaging.
- AT Cut Crystal
- 8 MHz to 50 MHz

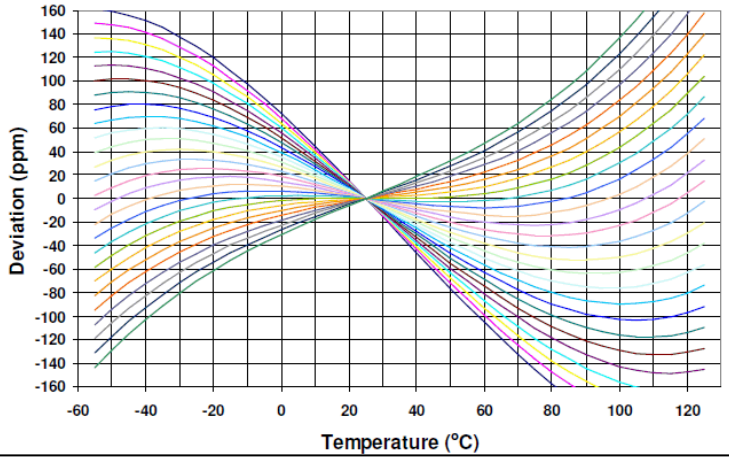
## Applications

Bluetooth
WLAN
IoT

## Electrical Characteristics

| **Parameter** | **Min** | **Typ** | **Max** | **Unit** | **Condition** (Consult factory for other options) |
|---|---|---|---|---|---|
| Frequency Range | 8.0 | - | 50.0 | MHz | |
| Calibration Frequency Tolerance | ±10 | - | ±50 | ppm | at +25°C ± 3°C, see part number guide below for available options |
| Frequency Stability | ±10 | - | ±100 | ppm | see part number guide below for available options |
| Operating Temperature Range | -40 | - | +85 | °C | see part number guide below for available options |
| Storage Temperature Range | -55 | - | +125 | °C | |
| Equivalent Series Resistance (ESR) | - | - | 60<br>50<br>45<br>40<br>35<br>30 | Ω | 8 MHz ≤ Freq < 12 MHz<br>12 MHz ≤ Freq < 13 MHz<br>13 MHz ≤ Freq < 19 MHz<br>19 MHz ≤ Freq < 20 MHz<br>20 MHz ≤ Freq < 30 MHz<br>30 MHz ≤ Freq ≤ 50 MHz |
| Drive Level | - | - | 300 | µW | Use 10µW for testing |
| Shunt Capacitance (C0) | - | - | 5.0 | pF | Pad to Pad Capacitance |
| Aging at 25°C ± 3°C | - | - | ±3 | ppm | for the first year |
| | - | - | ±2 | ppm | Per year after the first year |

## AT Cut Crystal Frequency versus Temperature Typical Performance:



## Part Numbering (Example: CX532AZ-A1B2C3-35-25.0D18)

| Series Model | Packaging | | Operating Temperature (°C) | Frequency Stability (ppm) | Frequency Calibration Tolerance (ppm) | | ESR (Ω) | | Frequency (MHz) | Load Capacitance |
|---|---|---|---|---|---|---|---|---|---|---|
| **CX635A** | **Z** | **-** | **A1** | **B2** | **C3** | **-** | **35** | **-** | **25.0** | **D18** |
| | **Z = Tape/Reel**<br>Blank = Tape Only | | A4 = 0 to +70<br>**A1 = -10 to +70**<br>A5 = -20 to +70<br>AU = -20 to +75<br>AQ = -30 to +85<br>A2 = -40 to +85 | B1 = ±100<br>**B2 = ±50**<br>B3 = ±30<br>BR = ±25<br>B9 = ±20<br>B6 = ±15<br>B4 = ±10 | C1 = ±100<br>C2 = ±50<br>**C3 = ±30**<br>C7 = ±25<br>C5 = ±20<br>C8 = ±15<br>C4 = ±10 | | See ESR Table | | | D12 = 12 pF<br>D16 = 16 pF<br>**D18 = 18 pF**<br>D20 = 20 pF<br>DS = Series<br><br>Standard loads, others available, check with sales with your requirement |

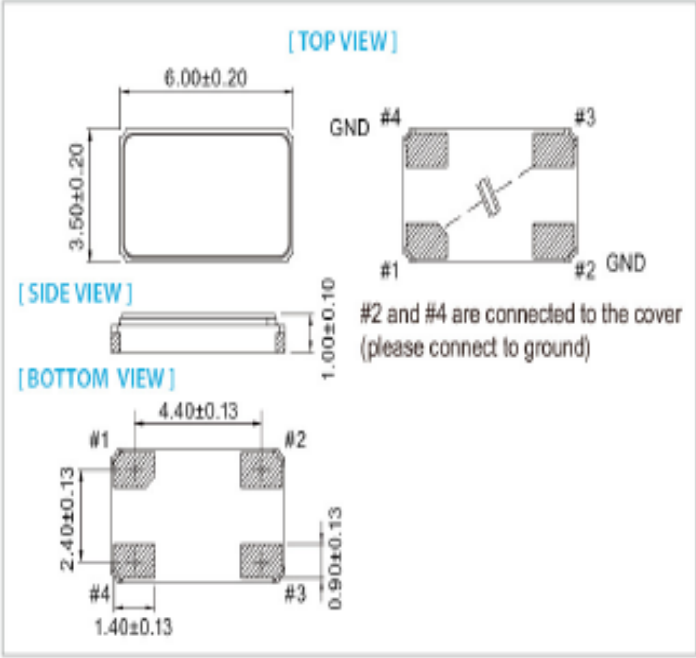
## Available Frequency Stability versus Temperature in ppm

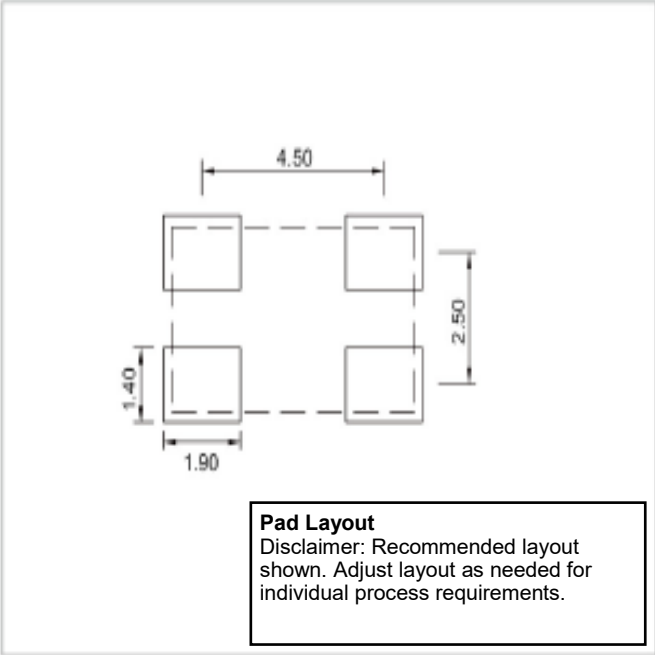
| | | B4 | B6 | B9 | BR | B3 | B2 | B1 |
|---|---|---|---|---|---|---|---|---|
| | | ±10 | ±15 | ±20 | ±25 | ±30 | ±50 | ±100 |
| 0 to +70°C | A4 | ● | ● | ● | ● | ● | ● | ● |
| -10 to +70°C | A1 | ● | ● | ● | ● | ● | ● | ● |
| -20 to +70°C | A5 | ● | ● | ● | ● | ● | ● | ● |
| -20 to +75°C | AU | ● | ● | ● | ● | ● | ● | ● |
| -30 to +85°C | AQ | ● | ● | ● | ● | ● | ● | ● |
| -40 to +85°C | A2 | | △ | ● | ● | ● | ● | ● |

● = Available △ = Check with Cardinal

## Mechanical Dimensions - Solder Layout (mm)




**Pad Layout**
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

**Contacts (pads): (0.3 to 1µm) over Nickel (1.27 to 8.89 µm)**
**The chamfered pad may or may not be present and may be on any pad.**
The crystal is symmetrical, there is no Pad 1 preference. The part can be rotated 180° when being assembled on the PCB.

## Reliability

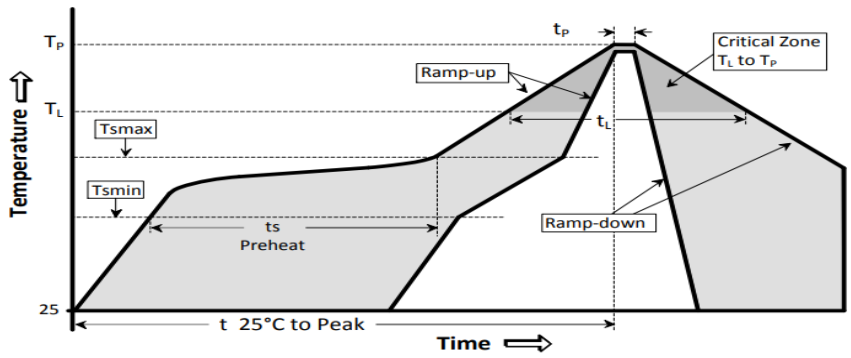
| Parameter | Condition |
|---|---|
| Mechanical Shock | MIL-STD-883, Method 2002, Condition B |
| Vibration | MIL-STD-883, Method 2007, Condition A |
| Solderability | IPC J-STD-002 |
| Thermal Cycle | MIL-STD-883 Method 1010, Condition B |

**Cardinal Components Inc. certifies this device is in accordance with the RoHS and REACH directives.**
Cardinal guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.064 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

For Optimum Jitter Performance, Cardinal recommends:
- Trace lengths to the crystal should be kept as short as possible.
- The crystal connections are sensitive to noise.
- The package should be grounded for optimum performance, pad 2 or 4 connected to ground.
- These very small crystals have high ESR, the oscillator start-up and operation should take this into consideration.
- These small crystals should have their maximum drive level limited to 100 µW.

## Reflow Cycle

**Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"**

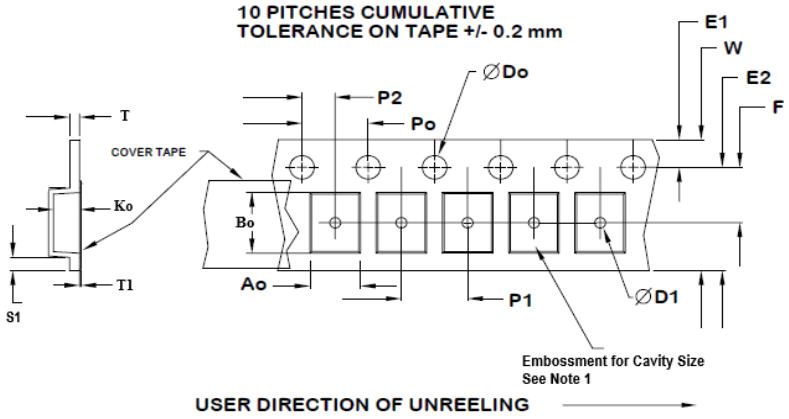


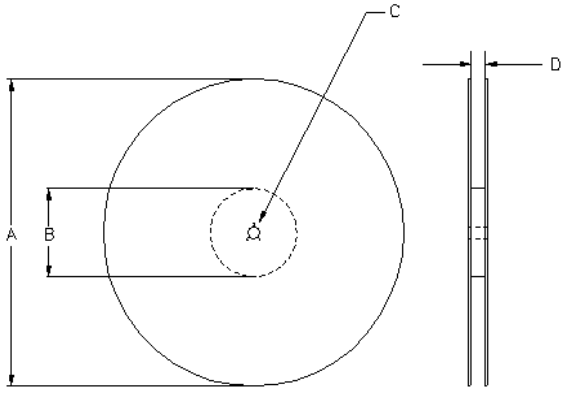

| Temperature Profile | Symbol | Condition | Unit |
|---|---|---|---|
| Average ramp-up rate | ($Ts_{max}$ to $T_P$) | 3°C / second max | °C / s |
| Ramp down Rate | $T_{cool}$ | 6°C / second max | °C / s |
| Time 25°C to Peak Temperature | $T_{to\text{-}peak}$ | 8 minutes max | min |
| **Preheat** | | | |
| Temperature min | $Ts_{min}$ | 150 | °C |
| Temperature max | $Ts_{max}$ | 200 | °C |
| Time $Ts_{min}$ to $Ts_{max}$ | ts | 60 – 180 | sec |
| **Soldering above liquidus** | | | |
| Temperature liquidus | $T_L$ | 217 | °C |
| Time above liquidus | $t_L$ | 60 – 150 | sec |
| **Peak temperature** | | | |
| Peak Temperature | Tp | 260 | °C |
| Time within 5°C of peak temperature | tp | 20 – 40 | sec |

The part may be reflowed 2 times without degradation (typical for lead free processing).

## Tape and Reel

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 1000. 16mm tape, 8mm pitch.




| Tape Variable Dimensions Table 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tape Size | E2 typ | F | P1 | W max | Ao | Bo | Ko |
| 16mm | 14.25 | 7.5 ±0.05 | 8.0 ± 0.1 | 16.3 | 3.95±0.1 | 6.5±0.1 | 1.35±0.1 |

Dimensions in mm Drawing Not to scale
Note 1: Embossed cavity to conform to EIA– 481-B

| Tape Constant Dimensions Table 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tape Size | Do | D1 min | E1 | Po | P2 | S1 min | T max | T1 max |
| 16mm | 1.5 +0.1 -0.0 | 1.5 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.1 | 0.6 | 0.3 | 0.1 |

| Reel Dimensions (may vary) Table 3 | | | | | | |
|---|---|---|---|---|---|---|
| | A | | B | | C | D |
| Reel Size | Inch-es | mm | Inches | mm | mm | mm |
| 7 | 7.0 | 177.8 | 2.50 | 63.5 | 13.0 +0.5 -0.2 | Tape size +0.4 +2.0 -0.0 |

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