



CX5
7.0 x 5.0 x 1.4 mm
Ceramic Package

Features

- Miniature low profile surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel Packaging.
- AT Cut Crystal

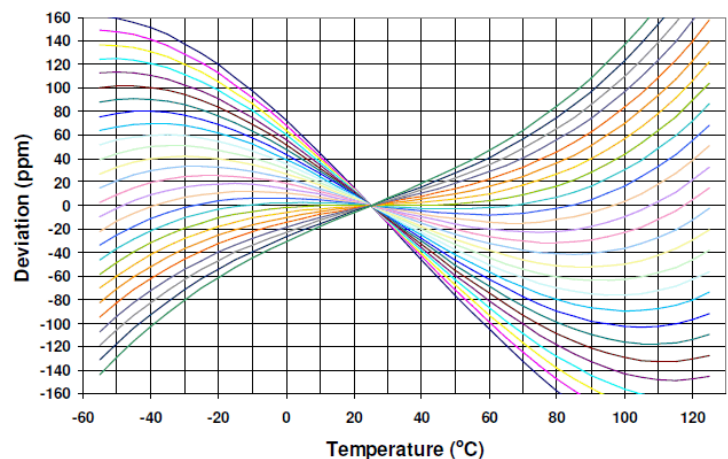
Applications

Bluetooth
WLAN
IoT

Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition
Frequency Range	7.3728	-	48.0	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)	-	-	45 40 35 30 25 80	Ω	7.3728 MHz ≤ Freq < 9 MHz 9 MHz ≤ Freq < 13 MHz 13 MHz ≤ Freq < 16 MHz 16 MHz ≤ Freq < 20 MHz 20 MHz ≤ Freq ≤ 36 MHz 30 MHz ≤ Freq < 48 MHz (3rd Overtone)
Drive Level	-	-	100	μW	Use 10μW for testing
Shunt Capacitance (C0)	-	-	7.0	pF	Pad to Pad Capacitance
Aging at 25°C ± 3°C	-	-	±3	ppm	for the first year
	-	-	±2	ppm	after the first year

AT Cut Crystal Frequency versus Temperature Typical Performance:



Part Numbering (Example: CX5Z-A1B3C2-25-25.0D18)

Series Model	Packaging		Operating Temperature Range	Frequency Stability (ppm)	Frequency Tolerance (ppm)		ESR (Ω)		Frequency (MHz)	Load Capacitance	Overtone
CX5	Z	-	A1	B3	C2	-	25	-	25.0	D18	
	Blank=Tape Only Z = Tape/Reel		A0 = -10 ~ +60°C A4 = 0 ~ +70°C A1 = -10 ~ +70°C A5 = -20 ~ +70°C AU = -20 ~ +70°C AQ = -30 ~ +85°C A2 = -40 ~ +85°C	B1 = ± 100 B2 = ± 50 B3 = ± 30 BR = ± 25 B9 = ± 20 B6 = ± 15 B4 = ± 10	C1 = ± 100 C2 = ± 50 C3 = ± 30 C7 = ± 25 C5 = ± 20 C8 = ± 15 C4 = ± 10		See ESR Table			D8 = 8 pF D10 = 10 pF D12 = 12 pF D16 = 16 pF D18 = 18 pF D20 = 20 pF DS = Series	Blank=Fund 3=3rd OT
										Standard loads, others available, check with sales for 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 +60°C	A0	•	•	•	•	•	•	•
-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		△	•	•	•	•	•

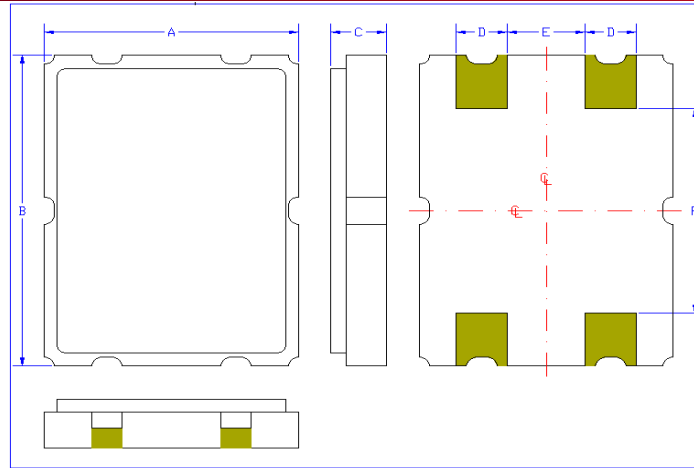
• = Available

△ = Check with Cardinal

Mechanical Dimensions

	Inches	mm
A	0.138 ± 0.008	5.0 ± 0.2
B	0.236 ± 0.008	7.0 ± 0.2
C	0.055 max	1.4 max
D ¹	0.039	1.0
E ¹	0.061	1.54
F ¹	0.181	4.6

¹ Typical dimensions

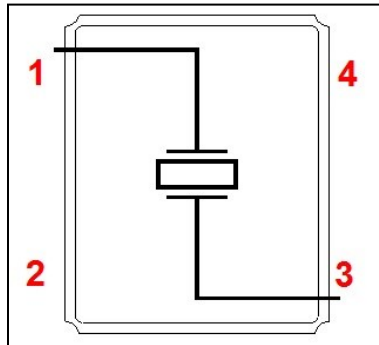


Contacts (pads): Gold (0.3 to 1µm) over Nickel (1.27 to 8.89 µm)

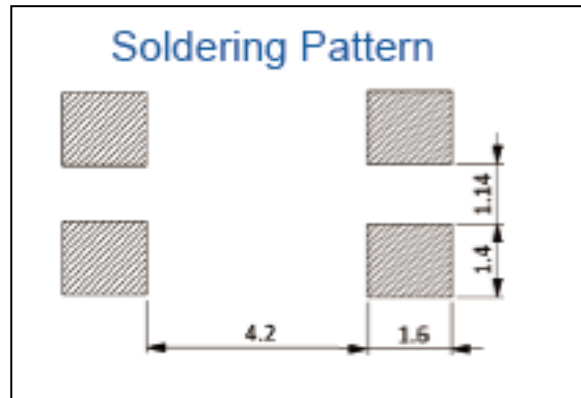
The chamfered pad may or may not be present and may be on any pad.

The crystal is symmetrical, there is no Pad 1 preference. The part can be rotated 180° when being assembled on the PCB.

Layout



Pad	Note
2 + 4	Connected to the metal cover



Pad Layout mm shown

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

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: 0.126 grams

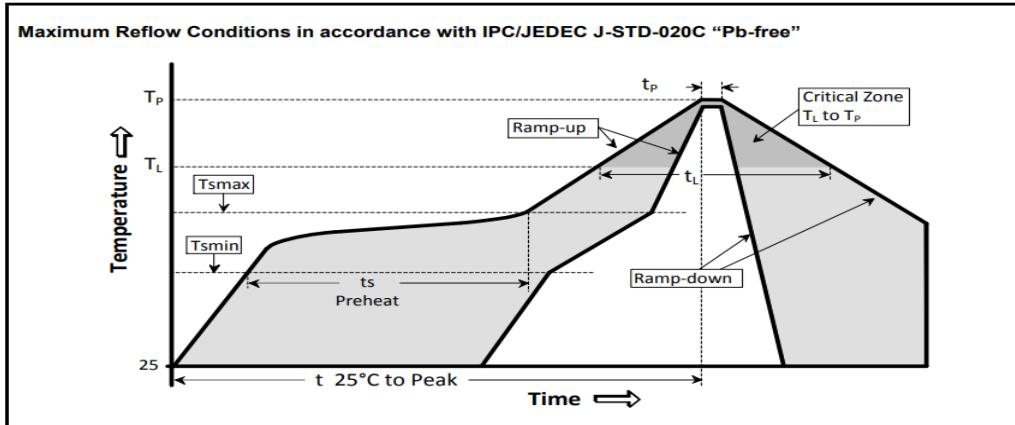
Moisture Sensitivity Level: 1 As defined in J-STD-020D

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.

Reflow Cycle

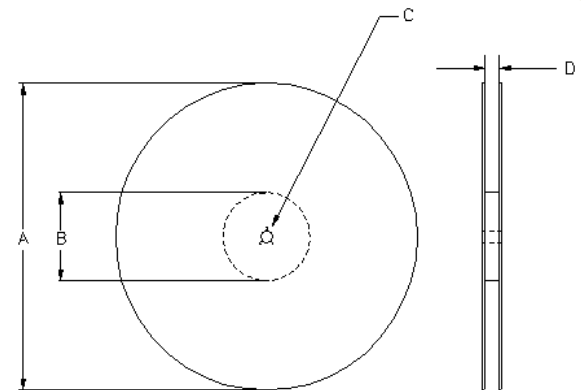
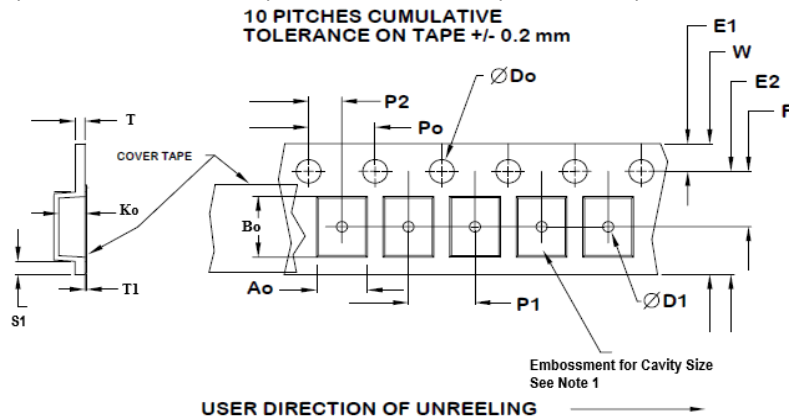


The part may be reflowed 2 times without degradation (typical for lead free processing).

Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	($T_{S_{max}}$ 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	$T_{to-peak}$	8 minutes max	min
Preheat			
Temperature min	$T_{S_{min}}$	150	°C
Temperature max	$T_{S_{max}}$	200	°C
Time $T_{S_{min}}$ to $T_{S_{max}}$	t_s	60 – 180	sec
Soldering above liquidus			
Temperature liquidus	T_L	217	°C
Time above liquidus	t_L	60 – 150	sec
Peak temperature			
Peak Temperature	T_P	260	°C
Time within 5°C of peak temperature	t_p	20 – 40	sec

Tape and Reel

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



Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
16mm	14.25	7.5 ±0.05	8.0 ±0.1	16.3	5.5±0.1	7.4±0.1	1.65±0.1

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

Tape Size	Do	D1 typ	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 Size	A		B		C	D
	Inches	mm	Inches	mm		
7	7.0	177.8	2.50	63.5	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0
10	10.0	254.0	4.00	101.6		
13	13.0	330.2	3.75	95.3		

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