CARDINAL COMPONENTS

CX1612
Miniature SMD Crystal

CX1612
1.65 x 1.25 x 0.4 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
- 24 MHz to 60 MHz

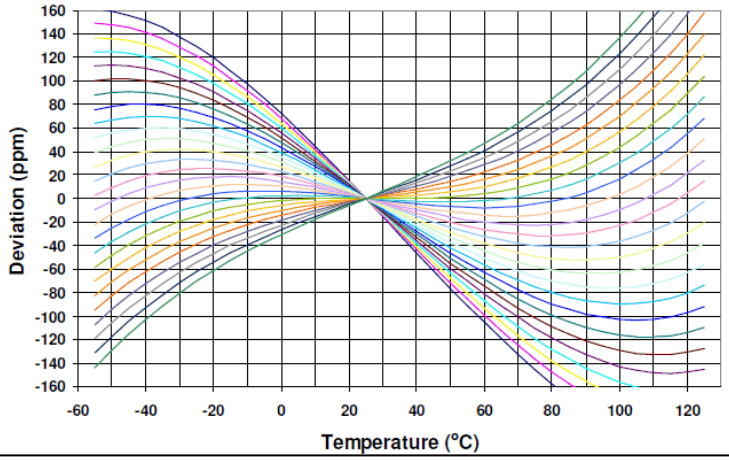
Applications

Bluetooth
WiFi
WLAN
IoT
Wearables
Zigbee

Electrical Characteristics

Parameter	**Min**	**Typ**	**Max**	**Unit**	**Condition** (Consult factory for other options)
Frequency Range	24	-	60	MHz	
Calibration Frequency Tolerance	±10	-	±50	ppm	at +25°C ± 3°C, see part number guide below for available options
Frequency Stability	±10	-	±50	ppm	see part number guide below for available options
Operable Temperature Range	-40	-	+85	°C	see part number guide below for available options
Equivalent Series Resistance (ESR)	-	-	150 100	Ω	24 MHz ≤ Freq < 40 MHz 40 MHz ≤ Freq ≤ 60 MHz
Drive Level	-	-	100	µW	Use 10µW for testing
Shunt Capacitance (C0)	-	-	3.0	pF	Pad to Pad Capacitance
Aging at 25°C ± 3°C	-	-	±5	ppm	for the first year
	-	-	±2	ppm	after the first year
Storage Temperature Range	-55	-	+125	°C	

AT Cut Crystal Frequency versus Temperature Typical Performance:



Part Numbering (Example: CX1612Z-A1B2C3-150-38.4D8)

Series Model	Packaging		Operating Temperature (°C)	Frequency Stability (ppm)	Frequency Calibration Tolerance (ppm)		ESR (Ω)		Frequency (MHz)	Load Capacitance
CX1612	**Z**	**-**	**A1**	**B2**	**C3**	**-**	**150**	**-**	**38.4**	**D8**
	Z = Tape/Reel Blank=Tape Only		A4 = 0 to +70 **A1 = -10 to +70** A5 = -20 to +70 AU = -20 to +75 AQ = -30 to +85 A2 = -40 to +85	**B2 = ±50** B3 = ±30 BR = ±25 B9 = ±20 B6 = ±15 B4 = ±10	C2 = ±50 **C3 = ±30** C7 = ±25 C5 = ±20 C8 = ±15 C4 = ±10		See ESR Table			D6 = 6 pF **D8 = 8 pF** D10 = 10 pF D12 = 12 pF D16 = 16 pF DS = Series Standard loads, others available, check with sales with your requirement

Available Frequency Stability versus Temperature in ppm

		B4	B6	B9	BR	B3	B2
		±10	±15	±20	±25	±30	±50
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

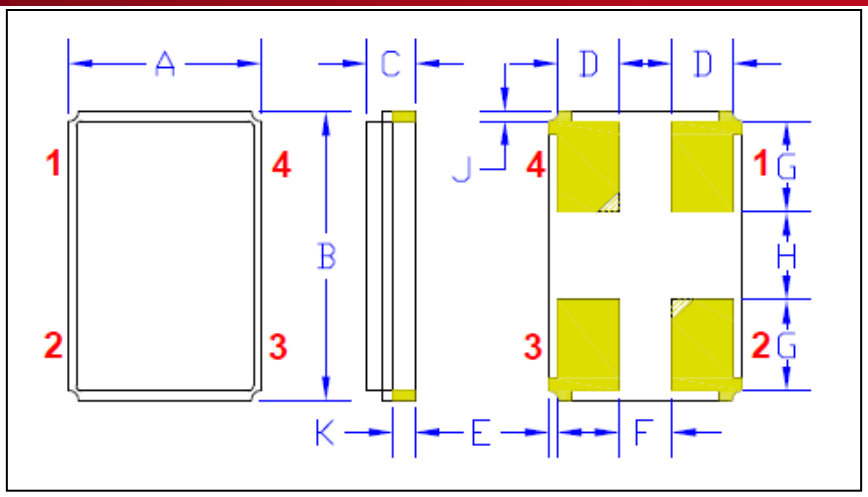
Reliability

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

Mechanical Dimensions

	Inches	mm
A	0.049 ± 0.006	1.25 ± 0.15
B	0.063 ± 0.006	1.65 ± 0.15
C	0.016 max	0.4 max
D	0.018	0.45
E[1]	0.002	0.05
F[1]	0.010	0.25
G[1]	0.022	0.55
H[1]	0.016	0.40
J[1]	0.002	0.05
K[1]	0.005	0.12

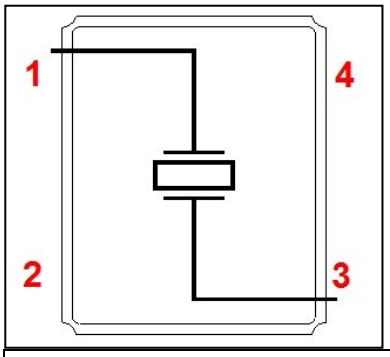
[1] Typical dimensions



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

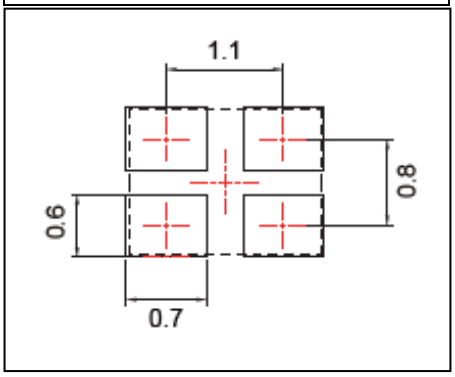
Pad 2 or Pad 4 may have the pad chamfered and connected to the lid. It is recommended to attach both pads 2 and 4 to ground, this will allow the part to be turned 180° and still be properly connected.

Layout



Note: Pad 2 or 4 may be connected to the lid

Recommended Solder Pad Layout



Pad Layout (mm)
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

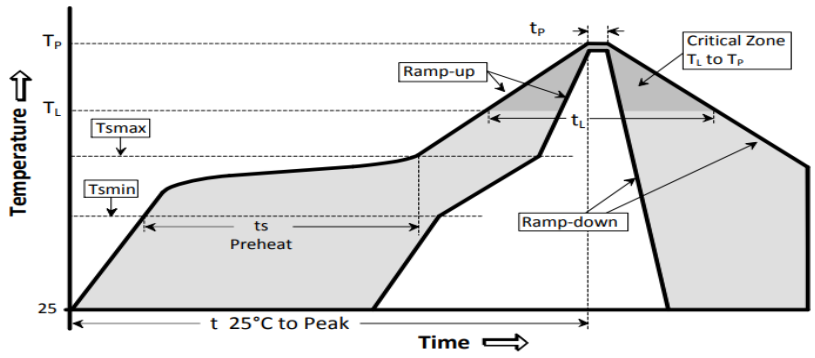
Cardinal Components Inc. certifies this device is in accordance with the RoHS and REACH directives.
Cardinal guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.003 grams
Second level interconnect code: e4

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 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"

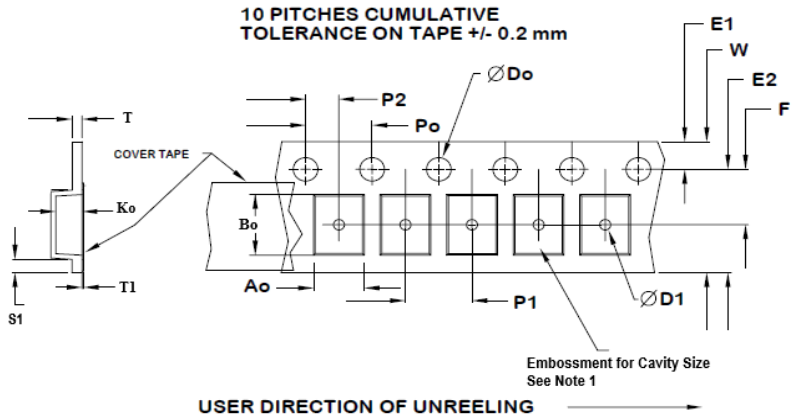


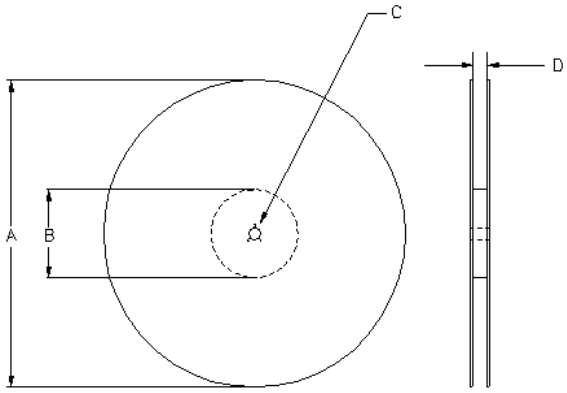
Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(Ts_{max} to T_P)	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to\text{-}peak}$	8 minutes max	min
Preheat			
Temperature min	Ts_{min}	150	°C
Temperature max	Ts_{max}	200	°C
Time 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 3000 per reel, cut tape for < 1000. 8mm tape, 4mm pitch.





Tape Variable Dimensions Table 2							
Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
8mm	6.25	3.5 ±0.05	4.0 ±0.1	8.3	1.45±0.1	1.85±0.1	0.45±0.1

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

Reel Dimensions (may vary) Table 3						
	A		B		C	D
Reel Size	Inches	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

Tape Constant Dimensions Table 1								
Tape Size	Do	D1 typ	E1	Po	P2	S1 min	T max	T1 max
8mm	1.5 +0.1 -0.0	0.6	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.6	0.25	0.1

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