CARDINAL COMPONENTS

CX212
Miniature SMD Watch Crystal

CX212
2.0 x 1.2 x 0.6 mm
Ceramic Package

Features

- Miniature low profile surface mount watch crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel Packaging.
- 32.768 kHz

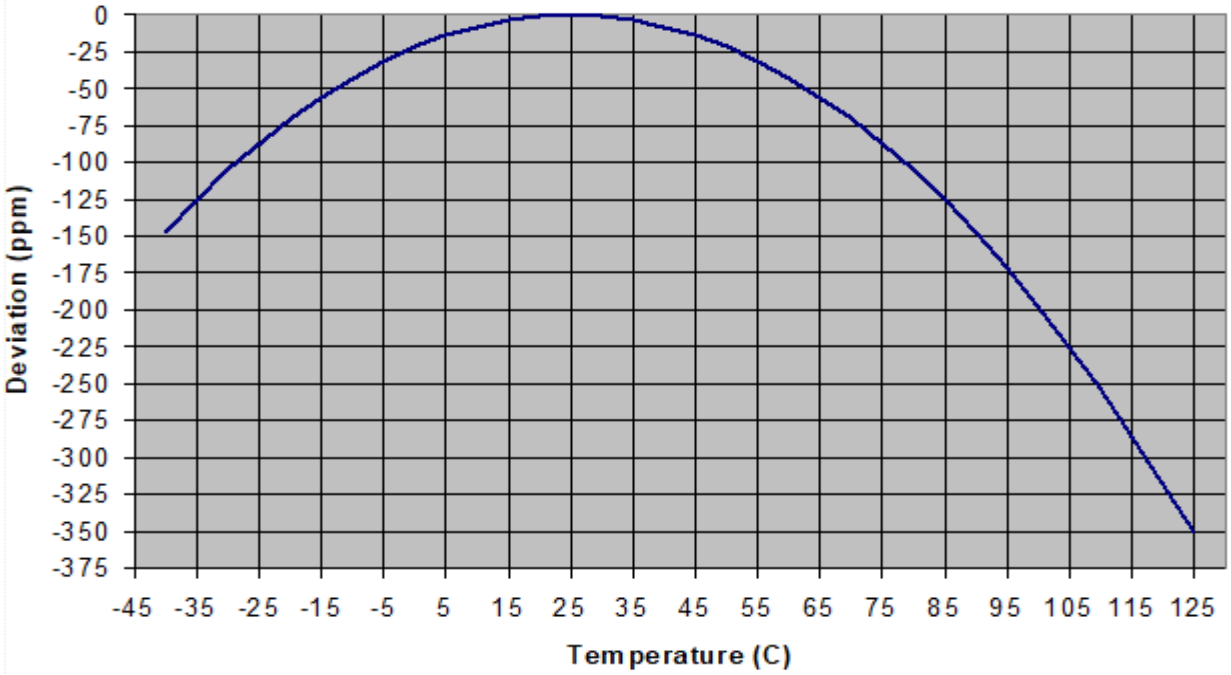
Applications

RTC

Electrical Characteristics

Parameter	**Min**	**Typ**	**Max**	**Unit**	**Condition** (Consult factory for other options)
Frequency Range	-	32.768	-	kHz	
Calibration Frequency Tolerance	-	-	±20	ppm	Standard at 25°C ± 3°C.
Frequency Stability	-0.028	-0.034	-0.04	ppm/Δ°C^2	
Turnover Temperature	20	25	30	°C	
Operating Temperature Range	-40	-	+85	°C	
Storage Temperature Range	-55	-	+125	°C	
Equivalent Series Resistance (ESR)	-	-	90	kΩ	
Drive Level	-	-	1	µW	
Q Factor	30000	-	-		
Shunt Capacitance (C0)	-	1.2	-	pF	Pad to Pad Capacitance
Motional Capacitance (C1)	-	3.7	-	fF	
Insulation Resistance	500	-	-	MΩ	@100VDC
Aging at 25°C ± 3°C	-	-	±3	ppm	for the first year at +25°C ± 3°C

Frequency versus Temperature - Typical Performance



Part Numbering (Example: CX212Z-A2C590-32.768D12.5)

Series Model	Packaging		Operating Temperature	Frequency Calibration Tolerance	Equivalent Series Resistance (ESR in kΩ)		Frequency (kHz)	Load Capacitance (CL)
CX212	Z	-	A2	C5	90	-	32.768	D12.5
	Z=Tape/Reel		A2 = -40 to +85°C	C5 = ±20 ppm				D12.5 = 12.5pF D9 = 9pF D7 = 7pF D6 = 6pF

Device Marking

1.Marking consists of a manufacturing date code
2.Orientation of marking may be mixed on the tape
3.Traceability of part's specification is lost once removed from reel

Reliability

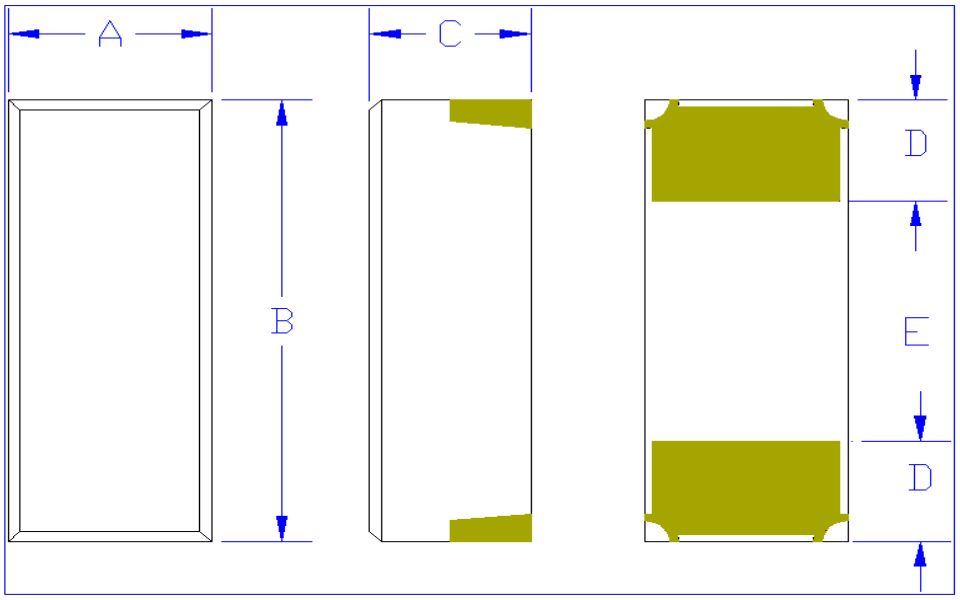
Parameter	Condition
Mechanical Shock	JESD22-B104
Vibration	JESD22-B103
Solderability	IPC J-STD-002
Thermal Shock	MIL-STD-883 Method 1011, Condition A

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: 0.004 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

Mechanical Dimensions

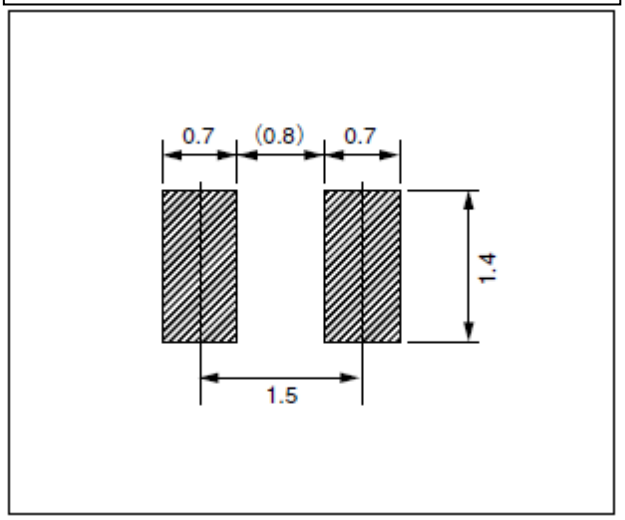
	Inches	mm
A	0.047 ± 0.004	1.2 ± 0.1
B	0.08 ± 0.004	2.05 ± 0.1
C	0.024 max	0.6 max
D[1]	0.02	0.5
E[1]	0.004	1.0

[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 either pad.
The crystal is symmetrical. The part can be rotated 180° when being assembled on the PCB and will still perform correctly. One pad may have a chamfered corner.

Solder pad layout



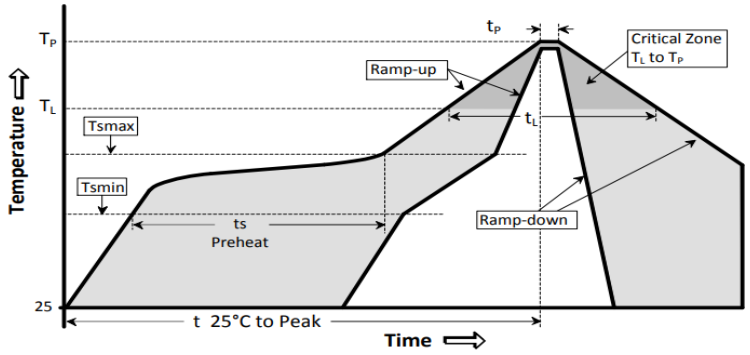
Pad Layout
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

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.
- These very small crystals have high ESR, the oscillator start-up and operation should take this into consideration.

Reflow Cycle

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

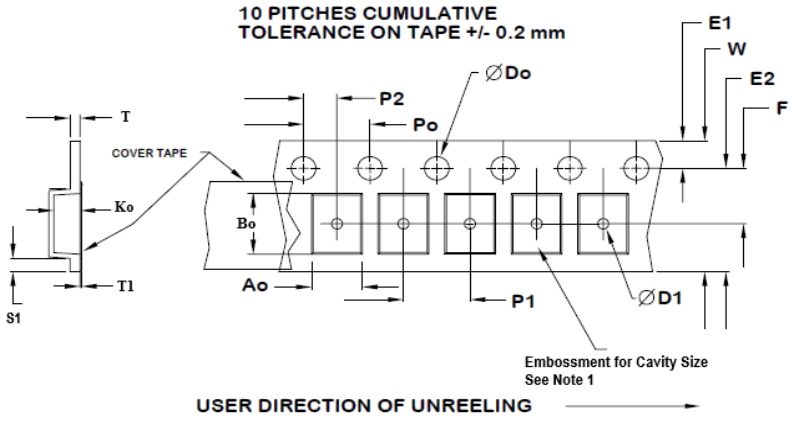


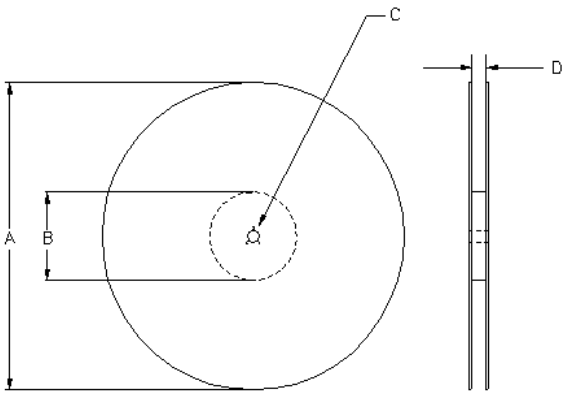
Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(Ts_{max} to T_P)	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to\text{-}peak}$	8 minutes max	min
Preheat			
Temperature min	Ts_{min}	150	°C
Temperature max	Ts_{max}	200	°C
Time 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 Dimensions Table 1							
Tape Size	E2 typ	F	P1	W	Ao	Bo	Ko
8mm	6.25	3.5 ±0.05	4.0 ±0.1	8.2	2.25	1.45	0.75

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	180	2.30	60	13.0 +0.5 -0.2	Tape size +2.0 -0.0

Tape Dimensions Table 2								
Tape Size	Do	D1	E1	Po	P2	S1 min	T max	T1 max
8mm	1.5 +0.1 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.6	0.3	0.1

Important Notice

Cardinal Components (CC) reserves the right to make corrections, improvements, modifications and other changes to this product at anytime. CC reserves the right to discontinue any product or service without notice. Customers are responsible for obtaining the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to CC's terms and conditions of sale supplied at the time of order acknowledgment.

CC warrants performance of this product to the specifications applicable at the time of sale in accordance with CC's limited warranty. Testing and other quality control techniques are used to the extent CC deems necessary to support this warranty. Except where mandated by specific contractual documents, testing of all parameters of each product is not necessarily performed.

CC assumes no liability for application assistance or customer product design. Customers are responsible for their products and applications using CC components. To minimize the risks associated with the customer products and applications, customers should provide adequate design and operating safeguards.

CC products are not designed, intended, authorized or warranted to be suitable for use in life support applications, weapons, weapon systems or space applications, devices or systems or other critical applications that may involve potential risks of death, personal injury or severe property or environmental damage. Inclusion of CC products in such applications is understood to be fully at the risk of the customer. Use of CC products in such applications requires the written approval of an appropriate CC officer. Questions concerning potential risk applications should be directed to CC.

CC does not warrant or represent that any license, either express or implied, is granted under any CC patent right, copyright, artwork or other intellectual property right relating to any combination, machine or process which CC product or services are used. Information published by CC regarding third-party products or services does not constitute a license from CC to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from CC under the patents or other intellectual property of CC.

Reproduction of information in CC data sheets or web site is permissible only if the reproduction is without alteration and is accompanied by associated warranties, conditions, limitations and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. CC is not responsible or liable for such altered documents.

Resale of CC products or services with statements different from or beyond the parameters stated by CC for that product or service voids all express and implied warranties for the associated CC product or service and is an unfair or deceptive business practice. CC is not responsible for any such statements.

Contacting Cardinal Components

Cardinal Components
19013 36th Ave. West
Lynnwood, WA 98036-5761
U.S.A.

Tel: 973-785-1333
Fax: 425.776.2760
email: sales@cardinalxtal.com
URL: www.cardinalxtal.com