



CSM1/4/5
12.5 x 4.5 mm
Metal Package

Features

- Low-profile surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- CSM1- 4.6mm; CSM4 - 3.5mm; CSM5 - 3.0mm height
- AT Cut Crystal
- 3.579545 MHz to 80 MHz

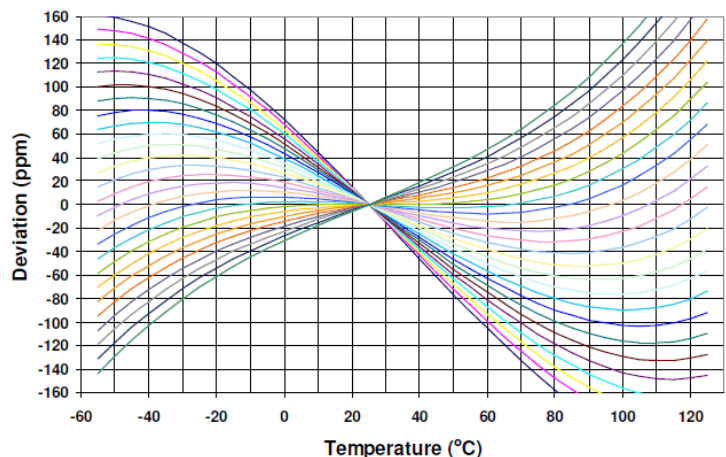
Applications

- Bluetooth
- WLAN
- IoT
- MPU
- Microcontroller
- Set-top Box

Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition (Consult factory for other options)
Frequency Range	3.579545	-	80	MHz	
Calibration Frequency Tolerance	±10	-	±100	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)	-	-	140 120 80 45 40 35 30 25 25 80 80	Ω	Freq < 4 MHz 4 MHz ≤ Freq < 5 MHz 5 MHz ≤ Freq ≤ 7 MHz 7 MHz < Freq ≤ 9 MHz 9 MHz ≤ Freq < 13 MHz 13 MHz ≤ Freq < 16 MHz 16 MHz ≤ Freq < 20 MHz 20 MHz ≤ Freq < 30 MHz 30 MHz ≤ Freq ≤ 36MHz 30 MHz ≤ Freq ≤ 36MHz (3rd Overtone) 36 MHz ≤ Freq ≤ 80MHz (3rd Overtone)
Drive Level	-	0.1	1.0	mW	
Shunt Capacitance (C0)	-	-	7.0	pF	Pad to Pad Capacitance
Aging at 25°C ± 3°C	-	-	±5	ppm	for the first year

AT Cut Crystal Frequency versus Temperature Typical Performance:



Part Numbering (Example: CSM1Z-A1B3C2-45-25.0D18)

Series Model	Added Features	Operating Temperature Range	Frequency Stability (ppm)	Frequency Tolerance (ppm)	ESR (Ω)	Frequency (MHz)	Load Capacitance Standards below, others available	Overtone
CSM1	Z	A1	B3	C2	45	25.0	D18	
	Blank = Bulk Z = Tape/Reel	A0 = -10 ~ +60°C A4 = 0 ~ +70°C A1 = -10 ~ +70°C A5 = -20 ~ +70°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 in Table		16pF = D16 18pF = D18 20pF = D20 Series = DS	Blank=Fund 3=3rd OT

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		•	•	•	•	•	•
-40 to +85°C A2			•	•	•	•	•

Available Frequency Tolerance versus Load Capacitance

Load Capacitance	B4	B6	B9	BR	B3	B2	B1
	± 10	± 15	± 20	± 25	± 30	± 50	± 100
8pF		△	•	•	•	•	•
12pF	△	•	•	•	•	•	•
16pF	△	•	•	•	•	•	•
20pF	•	•	•	•	•	•	•
Series	•	•	•	•	•	•	•

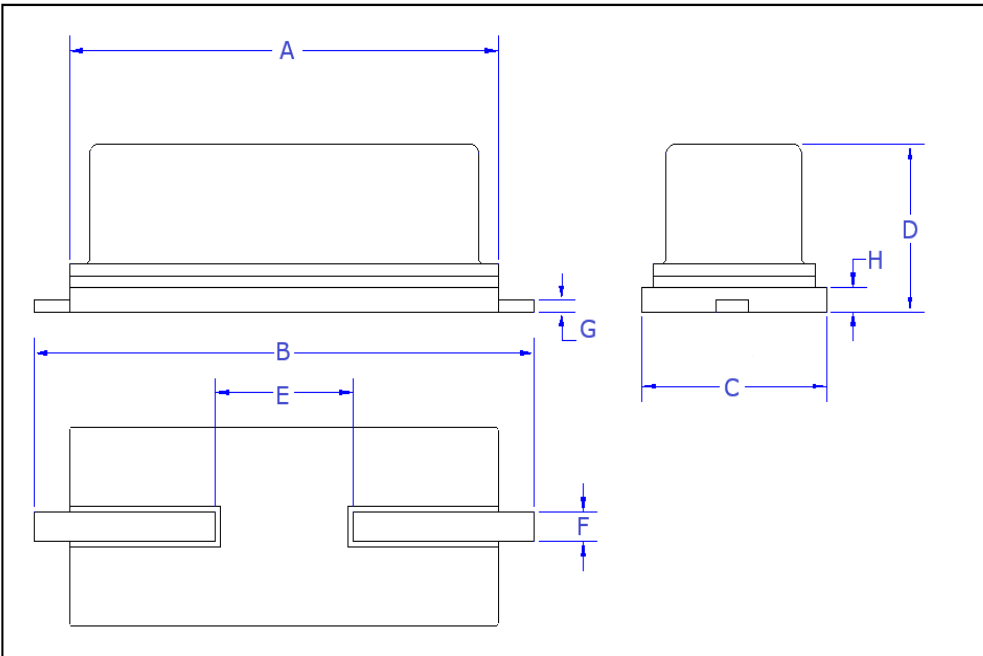
• = Available △ = Check with Cardinal

Note: Not all combinations may be available. Other specifications may be available. Please check with Cardinal sales.

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

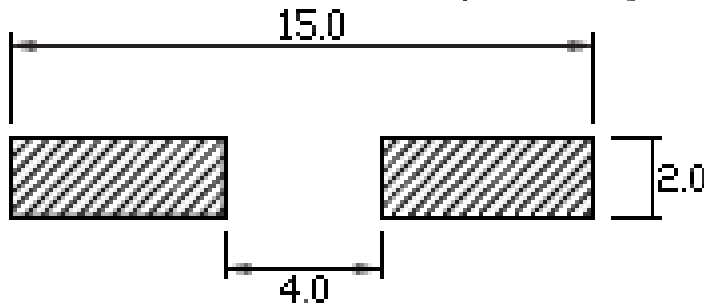


	mm
A	11.6 max
B	13 max
C	4.7 max
D	CSM1 - 4.6 max CSM4 - 3.5 max CSM5 - 3.0 max
E ¹	4.28
F	1.02 max
G ¹	0.3
H	0.55

¹ Typical dimension

(Not to Scale)
Termination Coating: Three types are possible: matte Sn; SnCu; SnAgCu (SAC)

Recommended solder pad layout



Pad Layout

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

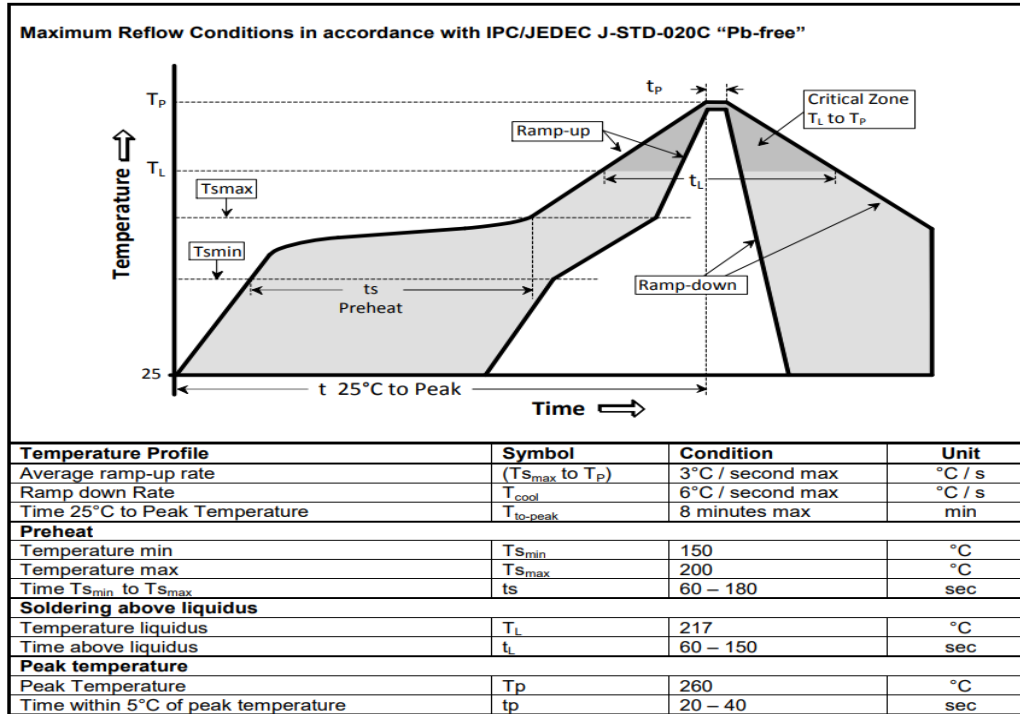
Cardinal Components Inc. certifies this device is in accordance with the RoHS and REACH directives.

Cardinal guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.56 ~ 0.5 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e1 or e2 or e3

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

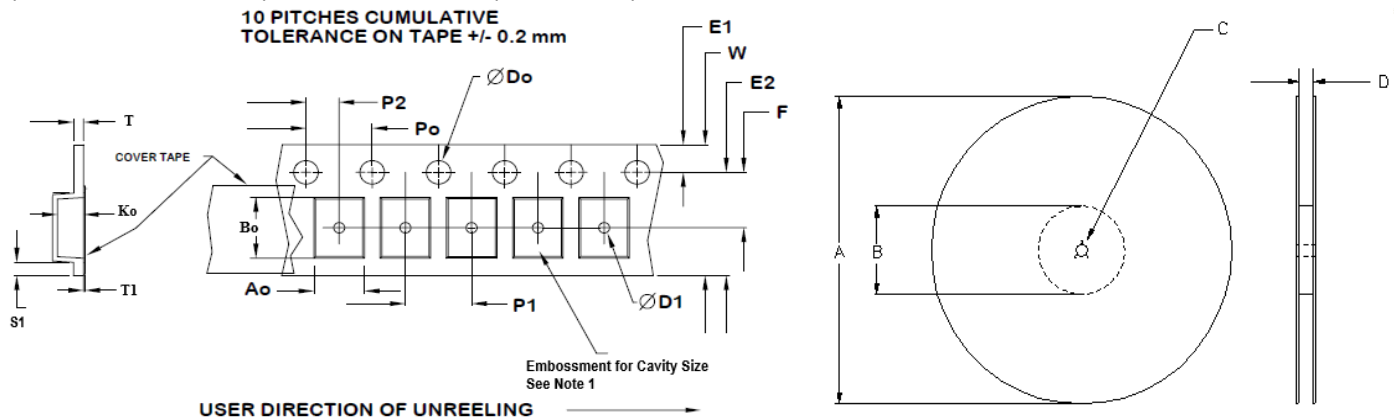
Reflow Cycle



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

Tape and Reel

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



Tape Size	Do	D1 typ	E1	Po	P2	S1 min	T	T1
24mm	1.5 +0.1 -0.0	1.5	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	0.6	0.4	0.1

Tape Size	B1 max	E2 min	F	P1	W max	Ao, Bo & Ko
24mm	18	22.25	11.5 ±0.1	12.0 ±0.1	24.3	Note 1

Dimensions in mm Drawing Not to scale

Reel Size	A		B		C	D
	Inches	mm	Inches	mm	mm	mm
13	13.0	330.2	4	100	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0

Note 1: Embossed cavity to conform to EIA- 481-B

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