



# CX9VSM CRYSTAL

32 kHz to 160 kHz

Ultra-Miniature, Low Profile  
Surface Mount Quartz Crystal

## DESCRIPTION

Designed and manufactured in the USA, the CX9V quartz crystal is available in frequencies from 32 kHz to 160 kHz. Using micro-machining processes, this surface-mountable crystal is hermetically sealed within a ultra-miniature ceramic package to ensure high stability and low aging. Tight calibration and high frequency/temperature stability make the CX9V ideally suited for all low frequency applications.

## FEATURES

- Ultra-miniature, surface mount design (4.1 mm x 1.5mm)
- Low profile (typically 0.80mm)
- Available with glass or ceramic lid
- Hermetically sealed ceramic package
- High shock and vibration survival
- Excellent aging characteristics
- Designed for low power applications
- Full military testing available
- Designed and manufactured in the USA

## APPLICATIONS

### Medical

- Pacemaker, defibrillator, and other implantables
- Medical instruments

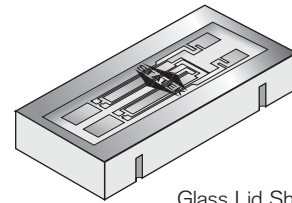
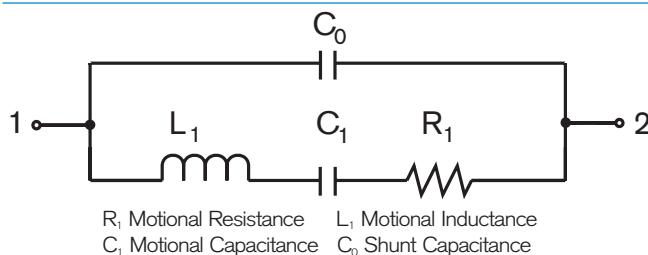
### Industrial, Computer, & Communications

- Smart card
- Down hole instrumentation
- Transponder / Animal migration
- Process instrumentation

### Military & Aerospace

- Airborne hybrid
- Navigational computer
- Real time clock

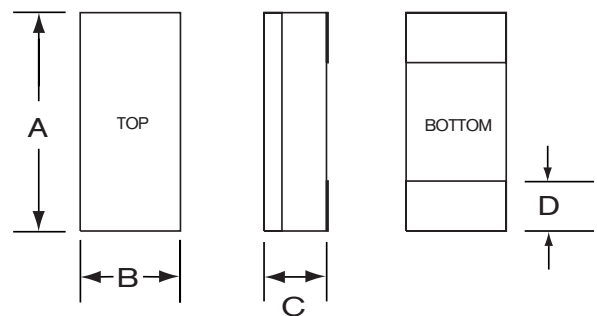
## EQUIVALENT CIRCUIT



Glass Lid Shown

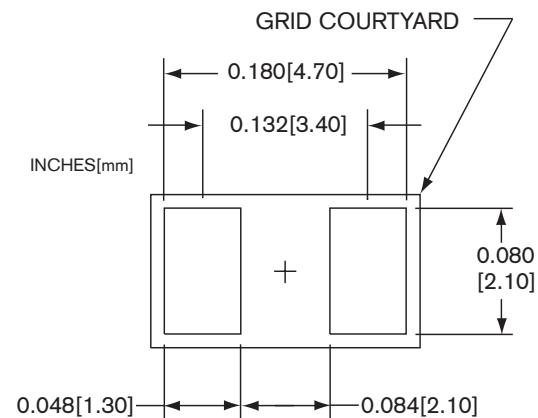
actual size  
 side view

## PACKAGE DIMENSIONS



DIM	TYP.		MAX.	
	inches	mm	inches	mm
A	0.160	4.10	0.170	4.32
B	0.060	1.50	0.068	1.73
C	-	-	see below	
D	0.031	0.79	0.038	0.97
DIM "C"	GLASS LID		CERAMIC LID	
MAX	inches	mm	inches	mm
SM1	0.035	0.89	0.038	0.97
SM2	0.036	0.91	0.039	0.99
SM3	0.037	0.94	0.040	1.02

## SUGGESTED LAND PATTERN



10157 - Rev A



## SPECIFICATIONS

Specifications are typical at 25°C unless otherwise noted.  
Specifications are subject to change without notice.

	32.768 kHz	100 kHz
Motional Resistance $R_1$ (k $\Omega$ )	70	19
Motional Capacitance $C_1$ (fF)	2.2	1.0
Quality Factor Q (k)	27	80
Shunt Capacitance $C_0$ (pF)	1.1	0.84
Load Capacitance (pF)*	9	5
Turning Point (°C)**	20	16

Standard Calibration Tolerance\*\*\*

Glass Lid:  $\pm 30$  ppm,  $\pm 100$  ppm,  $\pm 1000$  ppm  
Ceramic Lid:  $\pm 100$  ppm,  $\pm 1000$  ppm,  $\pm 10000$  ppm

Drive Level	0.5 $\mu$ W MAX
Temperature Coefficient (k)	-0.035 ppm/°C <sup>2</sup>
Aging, first year	5 ppm
Shock, survival	5,000 G peak, 0.3 ms, 1/2 sine
Vibration, survival	20 G RMS, 10-2,000 Hz random
Operating Temp. Range	-10°C to +70°C (Commercial) -40°C to +85°C (Industrial) -55°C to +125°C (Military)
Storage Temp. Range	-55°C to +125°C
Max Process Temperature	260°C for 20 sec.

Note: Deviation in frequency (f) @ temperature (T) from frequency ( $f_0$ ) @ turning point temperature ( $T_0$ );

$$\frac{f-f_0}{f_0} = k(T-T_0)^2$$

\* Other load capacitance values available

\*\* Other temperatures available

\*\*\* Tighter tolerances available

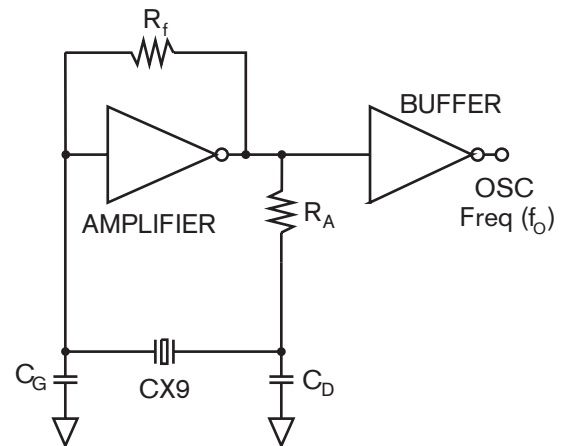
## TERMINATIONS

Designation	Termination
SM1	Gold Plated
SM2	Nickel, Solder Plated
SM3	Nickel, Solder Dipped

## PACKAGING OPTIONS

CX9VSM	-Tray Pack -16mm tape, 7" or 13" reels Per EIA 481 (see data sheet 10109)
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## CONVENTIONAL CMOS PIERCE OSCILLATOR CIRCUIT



## HOW TO ORDER CX9VSM CRYSTALS

