



## CX2VSM CRYSTAL

16 kHz to 600 kHz

Miniature Surface Mount  
Quartz Crystal for Pierce Oscillators

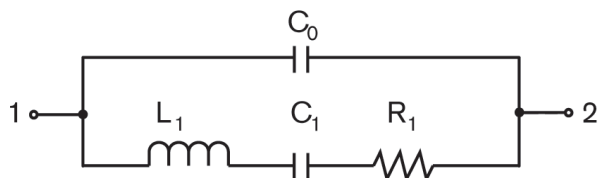
### DESCRIPTION

The CX2VSM quartz crystals are leadless devices designed for surface mounting on printed circuit boards or hybrid substrates. These miniature crystals are intended to be used in Pierce oscillators. They are hermetically sealed in a rugged, miniature ceramic package. They are manufactured using the STATEK-developed photolithographic process, and were designed utilizing the experience acquired by producing millions of crystals for industrial, commercial, military and medical applications. Maximum process temperature should not exceed 260°C.

### FEATURES

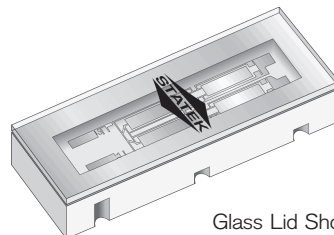
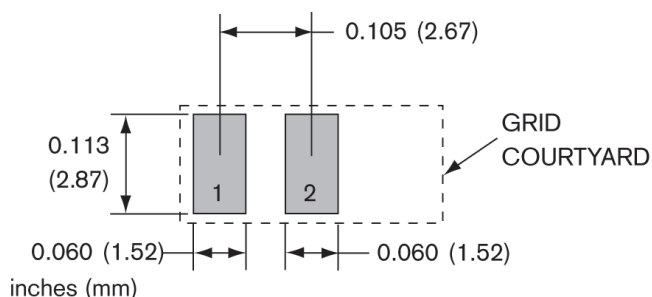
- Miniature tuning fork design
- High shock resistance
- Designed for low power applications
- Compatible with hybrid or PC board packaging
- Low aging
- Full military testing available
- Ideal for battery operated applications
- Designed and manufactured in the USA

### EQUIVALENT CIRCUIT



$R_1$  Motional Resistance  $L_1$  Motional Inductance  
 $C_1$  Motional Capacitance  $C_0$  Shunt Capacitance

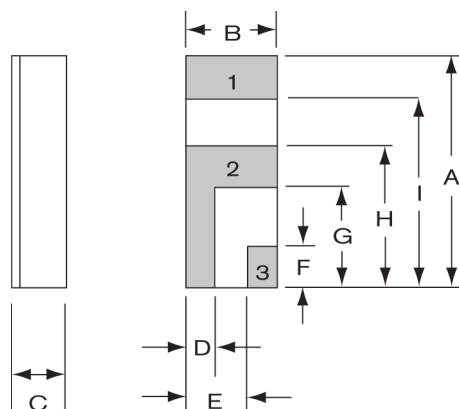
### SUGGESTED LAND PATTERN



Glass Lid Shown

Actual size  
Side view

### PACKAGE DIMENSIONS



DIM	TYP.		MAX.	
	inches	mm	inches	mm
A	0.260	6.60	0.275	6.99
B	0.094	2.39	0.108	2.74
C	-	-	see below	
D	0.035	0.89	0.045	1.14
E	0.059	1.50	0.069	1.75
F	0.050	1.27	0.060	1.52
G	0.105	2.67	0.115	2.92
H	0.155	3.94	0.165	4.19
I	0.210	5.33	0.220	5.59

DIM "C"	GLASS LID		CERAMIC LID	
MAX	inches	mm	inches	mm
SM1	0.065	1.65	0.075	1.91
SM2/SM4	0.067	1.70	0.077	1.96
SM3/SM5	0.070	1.78	0.080	2.03

Note: Terminal 1 is electrically connected internally to terminal 3

## SPECIFICATIONS

Specifications are typical at 25°C unless otherwise noted.

Specifications are subject to change without notice.

Frequency Range 16 kHz to 600 kHz

Functional Mode Tuning Fork (Flexure)

Standard Calibration Tolerance<sup>1</sup> (see table below)

Motional Resistance, ( $R_1$ ) See Figure 1  
MAX: 16-24.9 kHz, 2x Typ.  
25-600 kHz, 2.5x Typ.

Motional Capacitance, ( $C_1$ ) Figure 2

Quality Factor, ( $Q$ ) Figure 3  
MIN is 0.25x Typ.

Shunt Capacitance, ( $C_0$ ) 2.0 pF MAX.

Drive Level 16-24.9 kHz 0.5  $\mu$ W MAX

25-600 kHz 1.0  $\mu$ W MAX

Turning Point, ( $T_0$ )<sup>2</sup> Figure 4

Temperature Coefficient, (k) -0.035 ppm/°C<sup>2</sup>

Aging, first year 5 ppm MAX

Shock, survival<sup>3</sup> 1,500 g, 0.3 ms, 1/2 sine

Vibration, survival<sup>3</sup> 10 g RMS, 20-2,000 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.

1. Tighter frequency calibration available.

2. Other turning point available.

3. Higher shock and vibration available.

## CX2V Standard Calibration Tolerance at 25°C

Frequency Range (kHz)			
16-74.9	75-169.9	170-249.9	250-600
± 30 ppm (0.003%)	± 50 ppm (0.005%)	± 100 ppm (0.01%)	±200 ppm (0.02%)
± 100 ppm (0.01%)	± 100 ppm (0.01%)	± 200 ppm (0.02%)	±500 ppm (0.05%)
± 1000 ppm (0.1%)	± 1000 ppm (0.1%)	± 2000 ppm (0.2%)	±5000 ppm (0.5%)

## Load Capacitance ( $C_L$ ), Used to Calibrate CX2V (other $C_L$ available)

Frequency Range (kHz)	Load Capacitance (pF)	Frequency Range (kHz)	Load Capacitance (pF)
16-24.9	10	100.1-179.9	5
25-54.9	9	180-600	4
55-100.0	8		

## HOW TO ORDER CX2VSM CRYSTALS

CX2V	S	C	SM1	-	32.768K	,	30	/	I
*S* if special or custom design. Blank if Srd.			SM1 = Gold Plated (Lead Free) SM2 = Solder Plated SM3 = Solder Dipped SM4 = Solder Plated (Lead Free) SM5 = Solder Dipped (Lead Free)		Frequency K = kHz		Calibration Tolerance @ 25°C (in ppm)		Operating Temp. Range: C = -10°C to +70°C I = -40°C to +85°C M = -55°C to +125°C S = Customer Specified
Blank = Glass Lid C = Ceramic Lid									

FIGURE 1  
CX2V TYPICAL MOTIONAL RESISTANCE ( $R_1$ )

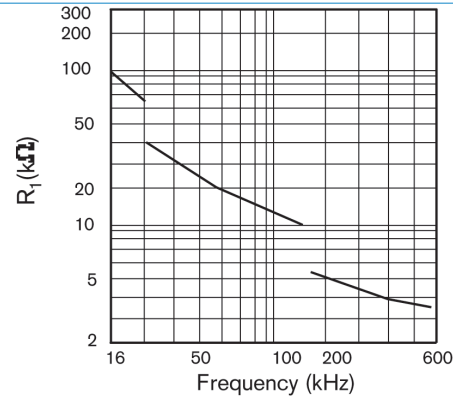


FIGURE 2  
CX2V TYPICAL MOTIONAL CAPACITANCE ( $C_1$ )

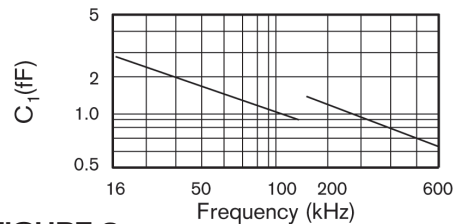


FIGURE 3  
CX2V TYPICAL QUALITY FACTOR ( $Q$ )

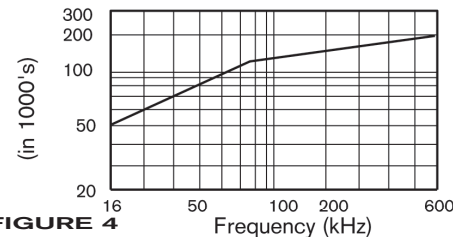
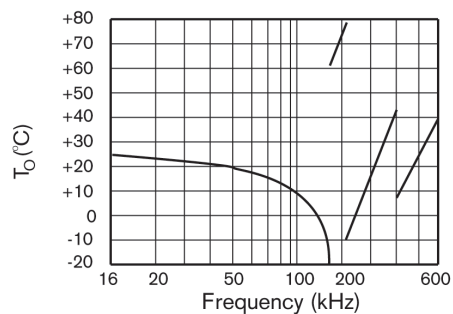


FIGURE 4  
CX2V TYPICAL TURNING POINT TEMP. ( $T_0$ )



Note: Frequency  $f$  at temperature  $T$  is related to frequency  $f_0$  at turning point temperature  $T_0$  by:  $\frac{f-f_0}{f_0} = k(T-T_0)^2$

## TERMINATIONS

Designation	Termination
SM1	Gold Plated (Lead Free)
SM2	Solder Plated
SM3	Solder Dipped
SM4	Solder Plated (Lead Free)
SM5	Solder Dipped (Lead Free)

## PACKAGING OPTIONS

CX2VSM - Tray Pack  
-16mm tape, 7" or 13" reels  
(Reference tape and reel data sheet 10109)