

**“X4115” series 4.1x1.5x0.7 mm 32.768 KHz  
Tuning Fork Surface Mount Crystal**



**MERCURY**  
Since 1973

- Precision time piece in miniature ceramic package for SMD mounting.
- 100% RoHS compliant and lead-free product.
- Low aging. High shock and vibration resistant.
- Applications include real-time clocks, battery operated devices.

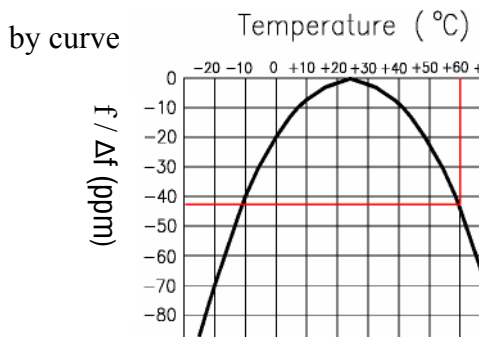


RoHS Compliant Product  
by Mercury

**GENERAL SPECIFICATIONS**

Mercury Part No.	<b>X4115-32.768K-12.5P or X4115-32.768K-9P</b>
Frequency	32.768KHz
Crystal Cut	X-CUT
Mode of Oscillation	Fundamental mode
Turnover Temperature	25°C ±5°C
Frequency Tolerance at 25°C	±20ppm max. with drive level at 0.1 uW
Frequency vs. Temperature	-0.035 ppm± 0.008 ppm/°C <sup>2</sup> max. Parabolic
Equivalent Series Resistance	50 KΩ typical; 65 KΩ max. with drive level at 0.1 uW
Shunt Capacitance (Co)	1.2 pF typical; 2.0 pF max.
Motional Capacitance (C1)	2.0 fF typical
Load Capacitance (CL)	9 pF or 12.5pF
Drive Level	0.1 μW typical; 0.5 u W max.
Aging at 25°C	±3 ppm / year max.
Insulation Resistance	500 MΩ min. at 100 V±15 V DC
Packaging	12 mm tape. 4 mm pitch, 177.4 mm reel, 3000 pcs per reel.

**FREQUENCY TEMPERATURE CHARACTERISTIC CURVE**



by calculation

Frequency deviation at one particular temperature (Tx) with respect to the frequency at +25°C is

$$\Delta f/f \text{ (ppm)} = -0.035 * (Tx - 25)^2$$

Example: at +60°C, the frequency drifts -42.8 ppm.

$$\Delta f / f \text{ (ppm)} = -0.035*(60-25)^2 = - 42.8 \text{ ppm}$$

**HOW TO ORDER**

Please order either X4115-32.768K-9P or X4115-32.768K-12.5P					☞: Please specify
X4115	—	32.768K	—	9P	
❶		❷		❸	
❶: Crystal package prefix ; ❷: Frequency: 32.768 KHz; ❸: Load Capacitance (CL): 9P for 9 pF load capacitance; 12.5P for 12.5 pF load capacitance.					

**MERCURY** [www.mercury-crystal.com](http://www.mercury-crystal.com)

Taiwan: TEL (886)-2-2695-7099, FAX (886)-2-2695-7473, e-mail: [sales-tw@mercury-crystal.com](mailto:sales-tw@mercury-crystal.com)

U.S.A.: TEL (1)-909-466-0427, FAX (1)-909-466-0762, e-mail: [sales-us@mercury-crystal.com](mailto:sales-us@mercury-crystal.com)

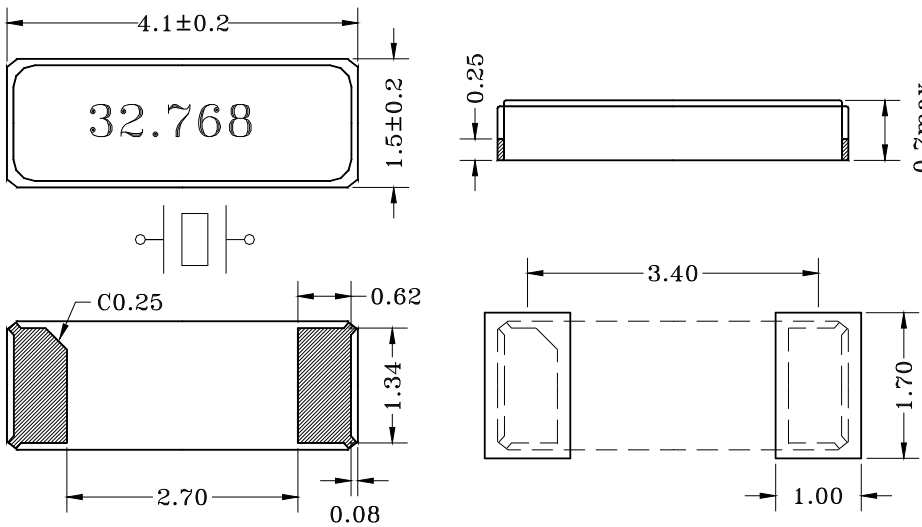


**ENVIRONMENTAL SPECIFICATIONS**

<b>Green Requirement</b>	RoHS compliant and Pb (lead) free
<b>Operable Temperature Range</b>	-40°C to +85°C
<b>Storage Temperature</b>	-55°C to +125°C
<b>Shock</b>	±10 ppm max. Free drop 3 times from 75 cm height onto a hard wooden board.
<b>Vibration</b>	±5 ppm max. Frequency: 10 to 60 Hz, amplitude: 1.5 mm , period: 2 ~3 min., duration: 2 hours each direction.
<b>Resistance to Soldering Heat</b>	±5 ppm max. Reflow twice at 260°C and 10 sec. max.
<b>Temperature Cycling</b>	±10 ppm max. 100 cycles of -40°C to +85°C, 30 min. soak time at each temp. extreme
<b>High and Low Temperature Operating Life</b>	±7 ppm max. at +85°C for 500 hours; ±10 ppm max. at -40°C for 500 hours
<b>Highly Accelerated Stress Test</b>	±10 ppm max. +60°C, 90 to 95% relative humidity for 500 hours

**PACKAGE DIMENSIONS AND RECOMMENDED LAND PATTERN**

unit: mm



**RECOMMENDED REFLOW**  
**SOLDERING PROFILE**

