

**RoHS Compliant  
Pb - Lead Free**

Ltr	Revisions	Date	Appr

**Electrical Specifications:**

<b>Nominal Frequency</b>		<b>32.768</b>	<b>KHz</b>
<b>Frequency Tolerance at 25° C</b>	<b>Standard</b>	<b>±20</b>	<b>PPM</b>
	<b>Optional</b>	<b>±10</b>	
<b>Aging per year</b>		<b>±3</b>	
<b>Turnover Temperature</b>		<b>25 ±5</b>	<b>° C</b>
<b>Temperature Coefficient</b>		<b>-0.034 ± 0.008 PPM/Δ °C<sup>2</sup></b>	
<b>Temperature Range</b>		<b>-40 to +85</b>	
<b>Temperature Range (Extended)</b>		<b>-40 to +125</b>	
<b>Temperature Range (Storage)</b>		<b>-55 to +140</b>	
<b>Equivalent Series Resistance</b>		<b>65</b>	<b>K Ohm Max</b>
<b>Load Capacitance</b>	<b>Standard</b>	<b>12.5</b>	<b>pF</b>
	<b>Optional</b>	<b>6.0</b>	
		<b>7.0</b>	
		<b>9.0</b>	
<b>Shunt Capacitance</b>		<b>1.7</b>	<b>pF Typ</b>
<b>Motional Capacitance</b>		<b>3.0</b>	<b>fF Typ</b>
<b>Drive Level</b>		<b>1.0</b>	<b>uW Max</b>
<b>Insulation Resistance</b>		<b>500 at 100 Vdc ± 15 Vdc</b>	<b>M Ohm Min</b>
<b>Quality Factor</b>		<b>70000</b>	<b>Typ</b>
<b>Capacitance Ratio</b>		<b>450</b>	
<b>Resistance to Shock</b>		<b>±5 PPM maximum offset from 75 cm drop test in all axes on to a hard surface.</b>	<b>-</b>



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All dimensions are millimeters.

CAD: TCR

Review: EG

Appr: JL

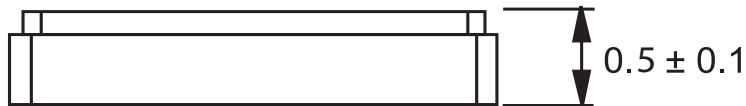
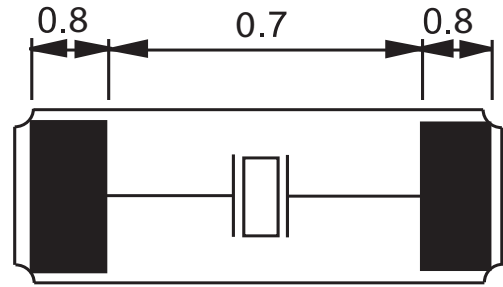
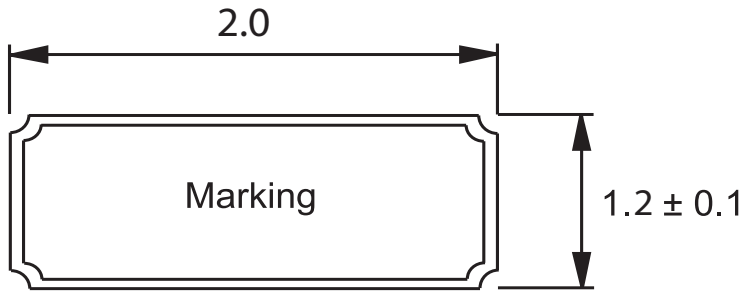
Page: 1/4 Date: Oct. 21, 2014

**Specification Title:**

**Microprocessor Crystal Unit  
32.768 KHz (Time of Day)  
2.0 x 1.2 millimeter Surface Mount  
Ceramic Package  
General Product Specification**

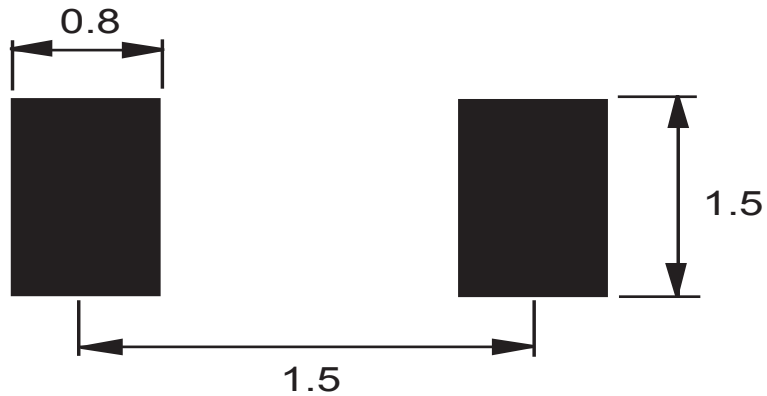
**Part Number: CTS2 Series**

**Mechanical Outline:**

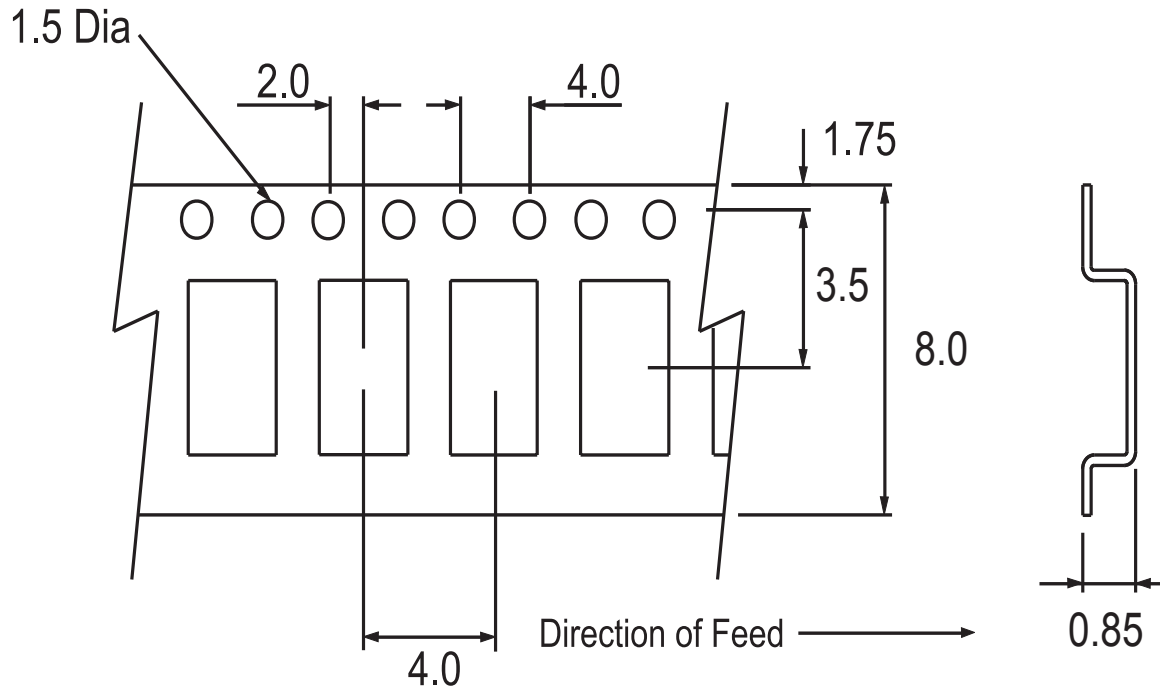


**Package is Ceramic-Metal.  
Dimensions are millimeters.**

**PCB Solder Pad Layout:**

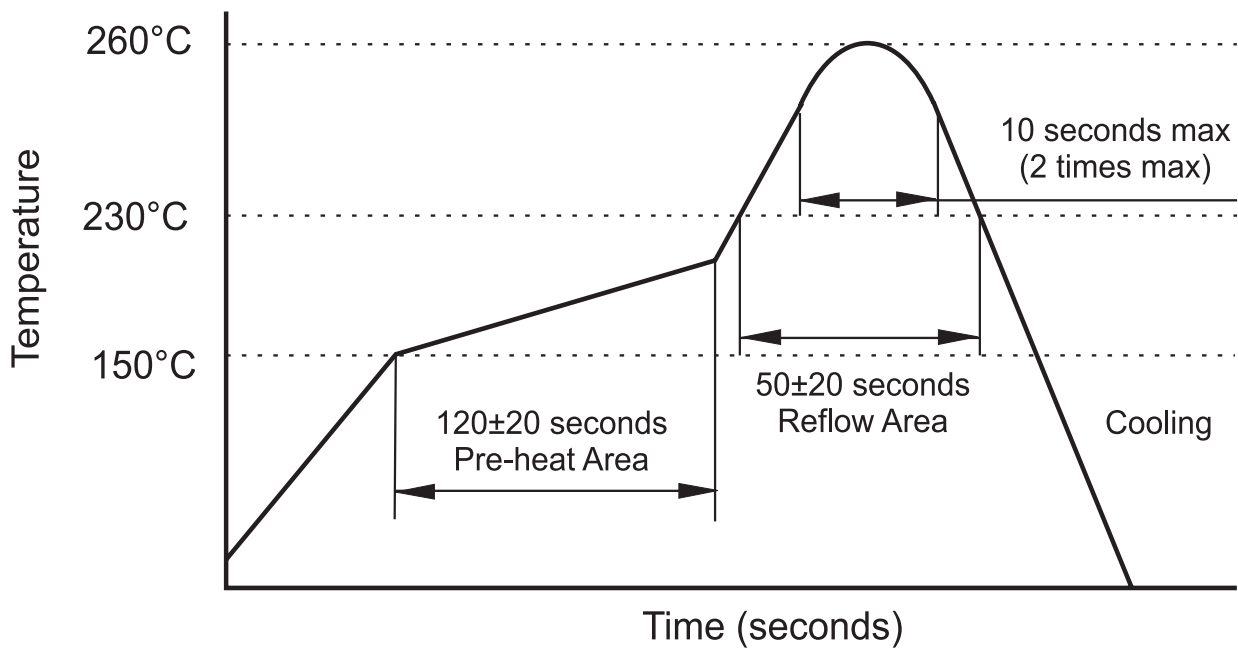


**Carrier Tape Dimensions:**



**Dimensions are millimeters.**

**Solder Reflow Characteristics:**



### How to build a Part Number:

Series		CTS	Parameter
Package		2	2.0 x 1.2 mm SMD
		-	
Frequency		32.768	KHz
		-	
Load Capacitance	Standard	12.5	12.5 pF
	Option	6	6 pF
		7	7 pF
		9	9 pF
		-	
Frequency Tolerance	Standard	20	±20 PPM
	Optional	10	±10 PPM
		-	
Temperature Range		See Notes	-40 to +85 °C
Temperature Range (Extended)			-40 to +125 °C
		-	

### Part Number Example:

CTS2-32.768-9-20-R

CTS2: 2.0 x 1.2 mm SMD Crystal Unit

32.768 KHz Nominal Frequency

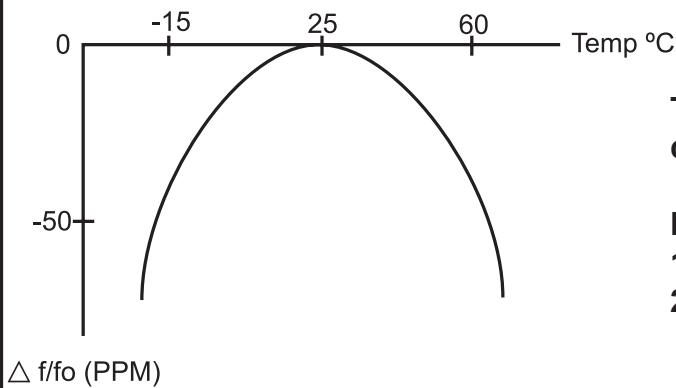
9 pF Load Capacitance

20: ±20 PPM Frequency Tolerance

-40 to +85° C Temperature Range

R: Tape and Reel Packaging

### Frequency vs. Temperature Characteristics:



To calculate the frequency stability the parabolic curvature constant (K) is needed.

For calculating the stability at 45 ° C?

1- Change in temperature ( $\Delta T$ ) is  $(45-25) = +20$  ° C

2- Change in frequency is  $(-0.034 \times (\Delta ^\circ C)^2) = (-0.035 \times (20)^2) = -13.6$  PPM

### Notes:

- 1- Standard Temperature Range does not need to be included in Part Number description.
- 2- Product is shipped in Tape and Reel configuration. Each reel contains 3000 pieces.
- 3- Specification subject to change without notice.