

**RoHS Compliant
Pb - Lead Free**

Ltr	Revisions	Date	Appr

Electrical Specifications:

Nominal Frequency		32.768	KHz
Frequency Tolerance at 25° C	Standard	±20	PPM
	Optional	±10	
Aging per year		±3	
Turnover Temperature		25 ±5	° C
Temperature Coefficient		-0.034 ± 0.008 PPM/Δ °C²	
Temperature Range		-40 to +85	
Temperature Range (Extended)		-40 to +125	
Temperature Range (Storage)		-55 to +140	
Equivalent Series Resistance		65	K Ohm Max
Load Capacitance	Standard	12.5	pF
	Optional	6.0	
		7.0	
		9.0	
Shunt Capacitance		1.7	pF Typ
Motional Capacitance		3.0	fF Typ
Drive Level		1.0	uW Max
Insulation Resistance		500 at 100 Vdc ± 15 Vdc	M Ohm Min
Quality Factor		70000	Typ
Capacitance Ratio		450	
Resistance to Shock		±5 PPM maximum offset from 75 cm drop test in all axes on to a hard surface.	-



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All dimensions are millimeters.

CAD: TCR

Review: EG

Appr: JL

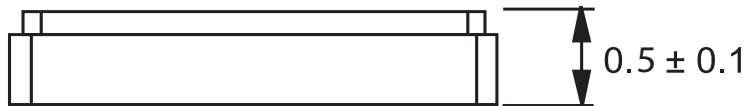
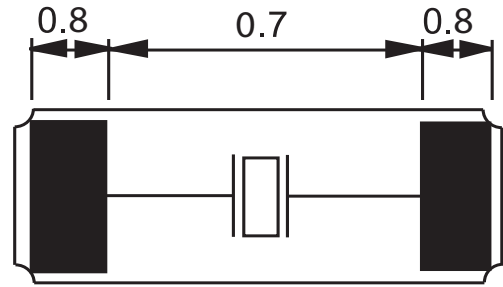
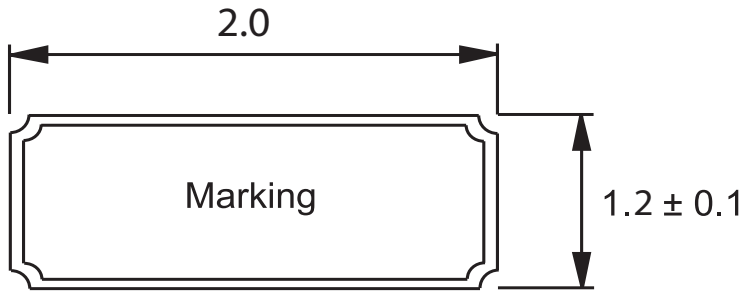
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Specification Title:

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

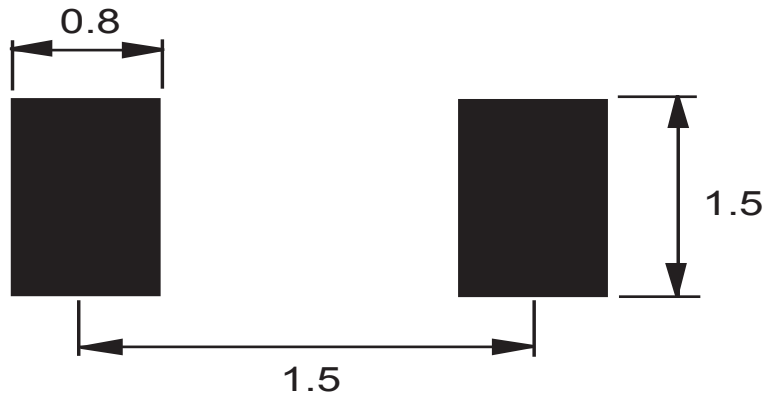
Part Number: CTS2 Series

Mechanical Outline:

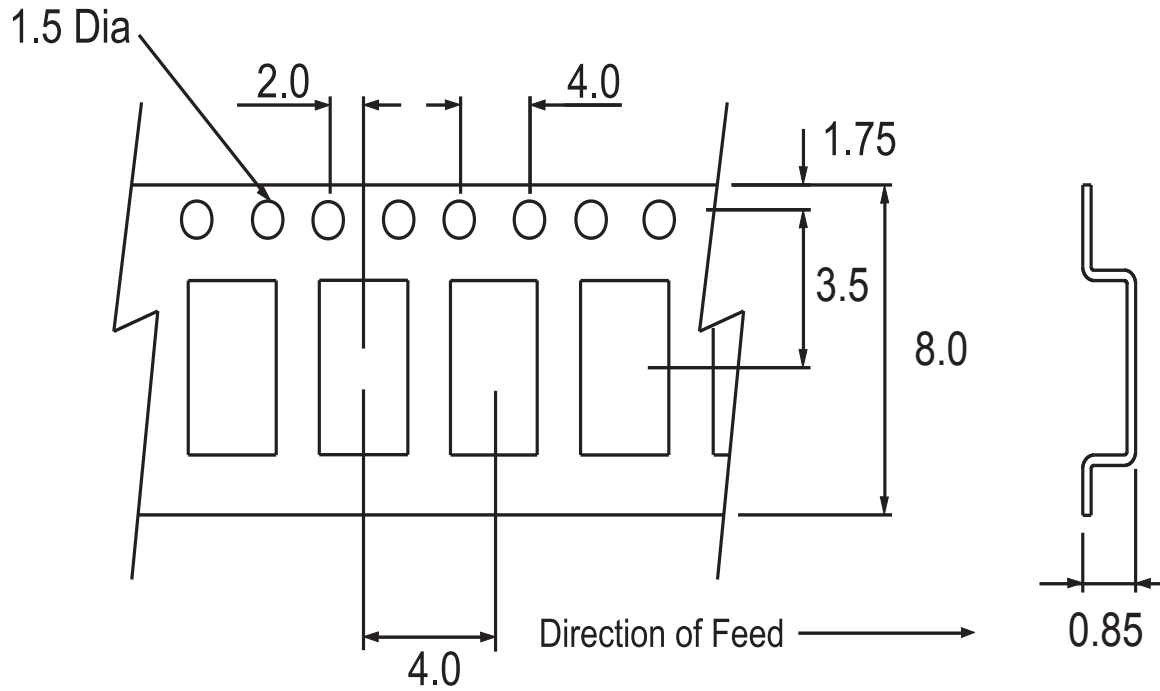


**Package is Ceramic-Metal.
Dimensions are millimeters.**

PCB Solder Pad Layout:

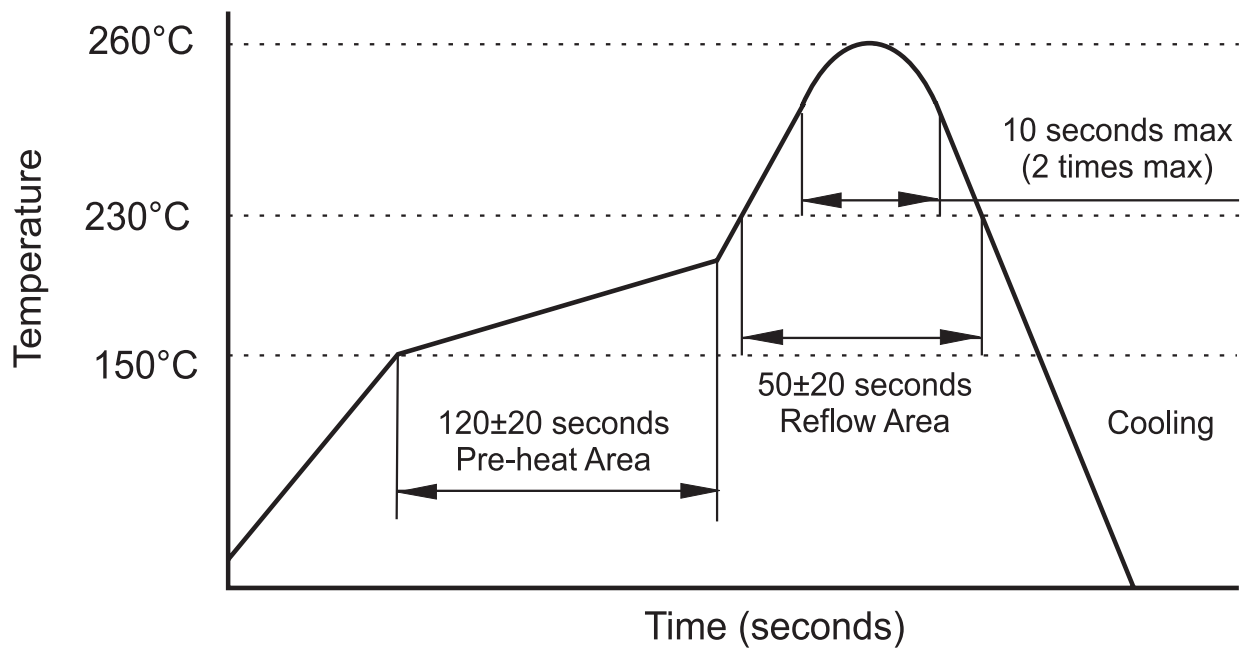


Carrier Tape Dimensions:



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

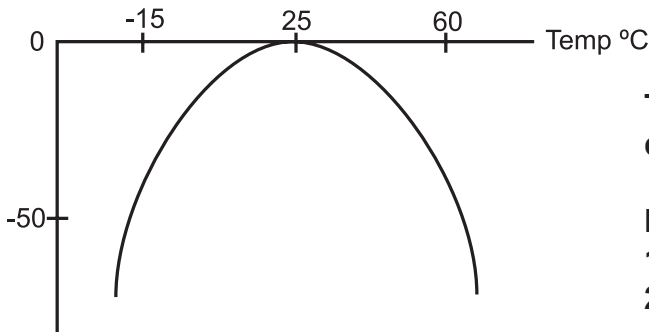
9 pF Load Capacitance

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 (ΔT) is $(45-25) = +20 \text{ }^\circ\text{C}$

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

$\Delta f/f_0$ (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.

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