

# 408 Series

## 0603 Time-Lag > Ceramic Fuse



### Description

Littelfuse 408 Series is a 100% lead-free, RoHS compliant, and halogen-free fuse designed specifically to provide overcurrent protection to circuits that operate under high working ambient temperatures up to 150 °C and high in-rush currents. The general design ensures excellent temperature stability and performance reliability. This high I<sup>2</sup>t time lag fuse is designed to have ultra-high in-rush current withstand capability to avoid nuisance fuse open.

### Features

- Operating Temperature from -55 °C to +150 °C
- UL Recognized to UL / CSA / NMX 248-1 and UL / CSA / NMX 248-14
- 100% Lead-free, RoHS compliant, and Halogen-free
- Suitable for both leaded and lead-free reflow / wave soldering
- Ultra-high I<sup>2</sup>t values

### Benefits

- Avoids nuisance opening due to high inrush and surge current inherent in the system
- High current ratings in small size

### Application

- Displays
- Servers
- Computers
- Printers
- Scanners
- Data Modems
- Gaming Consoles

### Web Resources



Download ECAD models, order samples, and find technical resources at [www.littelfuse.com](http://www.littelfuse.com)

### Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	1-7 A

### Electrical Characteristics

% of Ampere Rating	Opening Time at 25 °C
100%	4 hours Minimum
200%	120 secs Max
300%	3 secs Max
800%	0.05 secs Max

### Electrical Specifications

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating (AC/DC) <sup>1</sup>	Nominal Resistance (Ohms) <sup>2</sup>	Nominal Melting I <sup>2</sup> t (A <sup>2</sup> Sec.) <sup>3</sup>	Nominal Voltage Drop at Rated Current (V) <sup>4</sup>	Nominal Power Dissipation at Rated Current (W)	Agency Approval
1.00	001.	32	50A@32VDC	0.260	0.09	0.400	0.400	X
1.50	01.5	32		0.116	0.18	0.220	0.330	X
2.00	002.	32		0.065	0.55	0.190	0.380	X
2.50	02.5	32		0.052	0.65	0.180	0.450	X
3.00	003.	32		0.030	0.87	0.135	0.405	X
3.50	03.5	32		0.027	1.25	0.130	0.455	X
4.00	004.	32		0.018	2.40	0.120	0.480	X
5.00	005.	32		0.013	3.40	0.115	0.575	X
7.00	007.	32		0.0105	4.80	0.112	0.784	X

#### Notes:

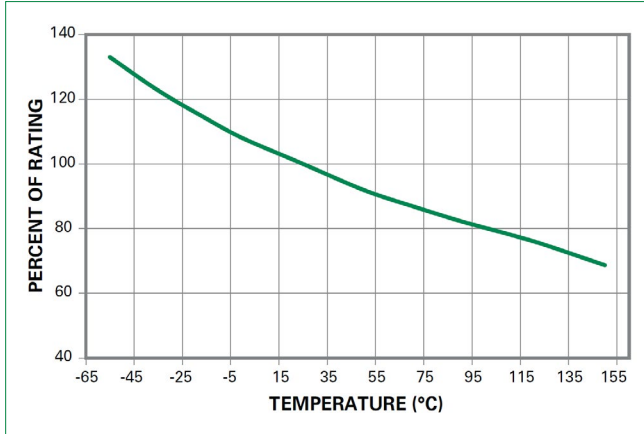
1. Nominal Resistance measured with < 10% rated current.
2. Nominal Melting I<sup>2</sup>t measured at 1 msec opening time.
3. Nominal Voltage Drop measured at rated current after temperature has stabilized.

- Devices designed to carry rated current for 4 hours minimum. It is recommended that devices be operated continuously at no more than 80% rated current. See Temperature Re-rating Curve for additional derating information.
- Devices designed to be mounted with marking code facing up.

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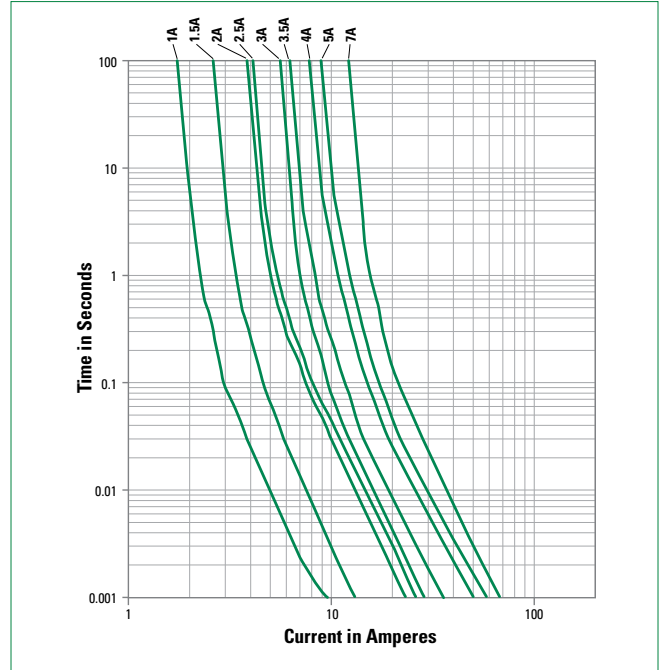
**Temperature Re-rating Curve**



**Note:**  
Re-rating depicted in this curve is in addition to the standard re-rating of 20% for continuous operation.

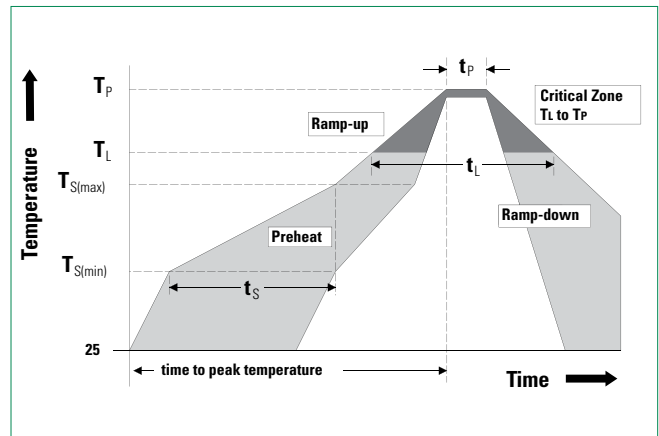
**Example:**  
For continuous operation at 75 °C, the fuse should be rerated as follows:  $I = (0.80)(0.85) I_{RAT} = (0.68) I_{RAT}$

**Average Time Current Curves**



### Soldering Parameters—Reflow Soldering

<b>Reflow Condition</b>		Pb-free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150 °C
	- Temperature Max ( $T_{s(max)}$ )	200 °C
	- Time (Min to Max) ( $t_s$ )	60–180 secs
<b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak)</b>		3 °C / second max.
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		5 °C / second max.
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217 °C
	- Temperature ( $t_L$ )	60–150 secs
<b>Peak Temperature (<math>T_p</math>)</b>		260+0 / -5 °C
<b>Time within 5 °C of actual peak Temperature (<math>t_p</math>)</b>		10–30 seconds
<b>Ramp-down Rate</b>		6 °C / second max.
<b>Time 25 °C to peak Temperature (<math>T_p</math>)</b>		8 minutes max.
<b>Do not exceed</b>		260 °C
<b>Wave soldering</b>		260 °C, 10 seconds max.



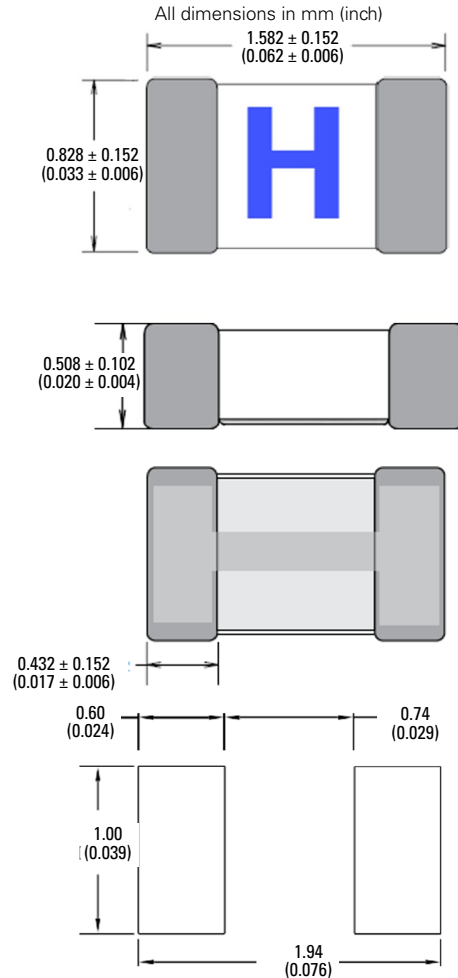
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### Product Characteristics

<b>Materials</b>	<b>Body:</b> Advanced Ceramic <b>Terminations:</b> Ag / Ni / Sn (100% Lead-free) <b>Element Cover Coating:</b> Lead-free Glass
<b>Moisture Sensitivity Level</b>	IPC / JEDEC J-STD-020, Level 1
<b>Solderability</b>	IPC / EIC / JEDEC J-STD-002, Condition B
<b>Humidity</b>	MIL-STD-202, Method 103, Conditions D
<b>Resistance to Solder Heat</b>	MIL-STD-202, Method 210, Condition B
<b>Moisture Resistance</b>	MIL-STD-202, Method 106
<b>Thermal Shock</b>	MIL-STD-202, Method 107, Condition B-3
<b>Mechanical Shock</b>	MIL-STD-202, Method 213, Condition A
<b>Vibration</b>	MIL-STD-202, Method 201
<b>Vibration, High Frequency</b>	MIL-STD-202, Method 204, Condition D
<b>Dissolution of Metallization</b>	IPC / EIC / JEDEC J-STD-002, Condition D
<b>Terminal Strength</b>	IEC 60127-4

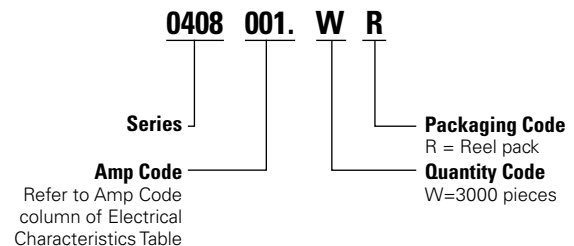
### Dimensions



### Part Marking System

Amp Code	Marking Code
001.	H
01.5	K
002.	N
02.5	O
003.	P
03.5	R
004.	S
005.	T
007.	V

### Part Numbering System



### Packaging

Packaging Option	Form Factor	Packaging Specification	Quantity	Quantity & Packaging Code
8mm Tape and Reel	Surface Mount	EIA-481, IEC 60286-3	3000	WR

**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.