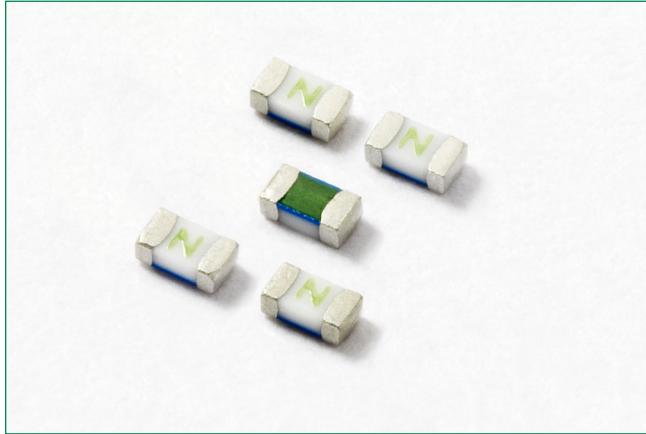


# 438 Series

## 0603 Fast-Acting Fuse



### Additional Information



Resources



Accessories



Samples

### Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0.250A – 6A
	29862	0.250A – 6A
	J50489122	0.250A – 6A
	N/A	0.250A – 6A
	N/A	0.250A – 6A

### Description

The 438 Series is a 100% Lead-free, RoHS compliant and Halogen-free fuse series designed specifically to provide over-current protection to circuits that operate under high working ambient temperature up to 150°C.

The general design ensures excellent temperature stability and performance reliability.

The high  $I^2t$  values which is typical in the Littelfuse Ceramic Fuse family ensure high inrush current withstand capability.

### Features & Benefits

- Operating Temperature from -55°C to +150°C
- 100% Lead-free, RoHS compliant and Halogen-free
- Suitable for both leaded and lead-free reflow / wave soldering
- Recognized to UL/CSA/NMX 248-1 and UL/CSA/NMX 248-14
- Conforms to EN 60127-1 and EN 60127-7
- CE Mark indicates suitability for the European Market
- UKCA Mark indicates suitability for the UK Market

### Applications

- Handheld Electronics
- LCD Displays
- Battery Packs
- Hard Disk Drives
- SD Memory Cards

### Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time at 25°C
100%	0.25A – 6A	4 Hours, Minimum
250%	0.25A – 6A	5 Seconds, Maximum

### Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating	Nominal Resistance (Ohms) <sup>2</sup>	Nominal Melting $I^2t$ (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 Approvals				
0.250	.250	63VDC	50A @ 63VDC 50A @ 32VAC	2.218	0.0017	0.550	0.138	x	x	x	x	x
0.375	.375	63VDC		1.247	0.0041	0.488	0.183	x	x	x	x	x
0.500	.500	63VDC		0.829	0.0100	0.486	0.243	x	x	x	x	x
0.750	.750	63VDC		0.466	0.0281	0.378	0.284	x	x	x	x	x
1.00	001.	63VDC		0.310	0.0593	0.351	0.351	x	x	x	x	x
1.25	1.25	63VDC		0.200	0.0510	0.365	0.456	x	x	x	x	x
1.50	01.5	63VDC		0.174	0.0902	0.368	0.552	x	x	x	x	x
1.75	1.75	63VDC		0.1405	0.1440	0.360	0.540	x	x	x	x	x
2.00	002.	32	50A @ 32VDC/12VAC	0.051	0.1490	0.107	0.214	x	x	x	x	x
2.50	02.5	32		0.0324	0.1977	0.095	0.238	x	x	x	x	x
3.00	003.	32		0.0255	0.2922	0.093	0.279	x	x	x	x	x
3.50	03.5	32		0.0205	0.4752	0.082	0.287	x	x	x	x	x
4.00	004.	32		0.0170	0.6920	0.079	0.316	x	x	x	x	x
5.00	005.	32		0.0115	0.7398	0.074	0.370	x	x	x	x	x
6.00	006.	24	50A @ 24VDC/12VAC	0.0085	1.3838	0.072	0.432	x	x	x	x	x

#### Notes:

1. AC Interrupting Rating tested at rated voltage with unity power factor. DC Interrupting Rating tested at rated voltage with time constant < 0.8 msec.
2. Nominal Resistance measured with < 10% rated current.
3. Nominal Melting  $I^2t$  measured at 1 msec. opening time.
4. Nominal Voltage Drop measured at rated current after temperature has stabilized.

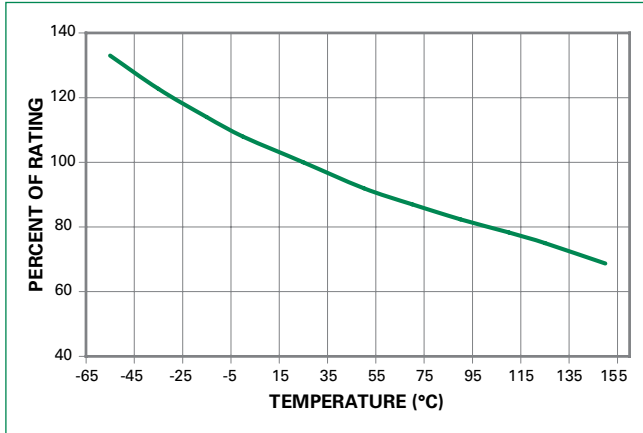
Devices designed to carry rated current for 4 hours minimum. It is recommended that devices be operated continuously at no more than 80% rated current. See "Temperature Re-rating Curve" for additional re-rating information.

Devices designed to be mounted with marking code facing up.

# 438 Series

## 0603 Fast-Acting Fuse

### Temperature Re-rating Curve



#### Note:

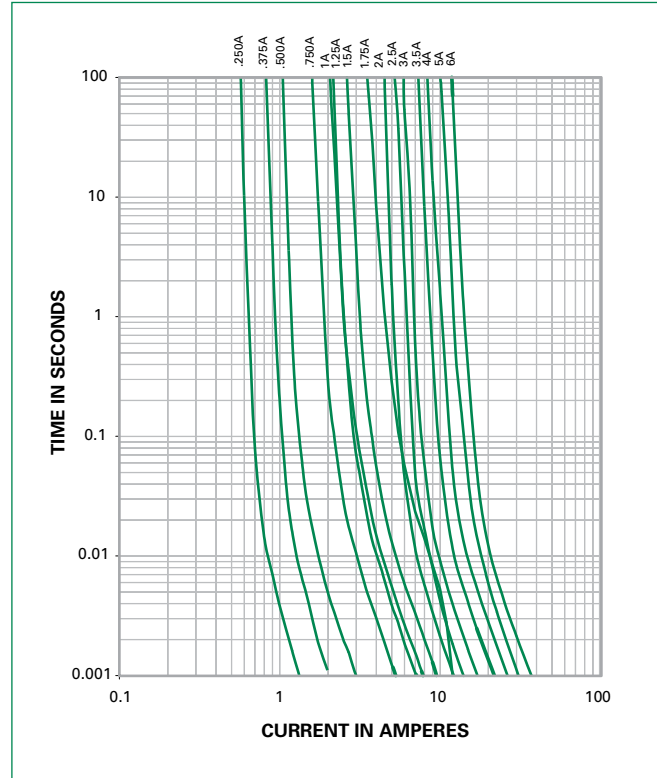
1. Re-rating depicted in this curve is in addition to the standard re-rating of 20% for continuous operation.

#### Example:

For continuous operation at 75 degrees celsius, the fuse should be rerated as follows:

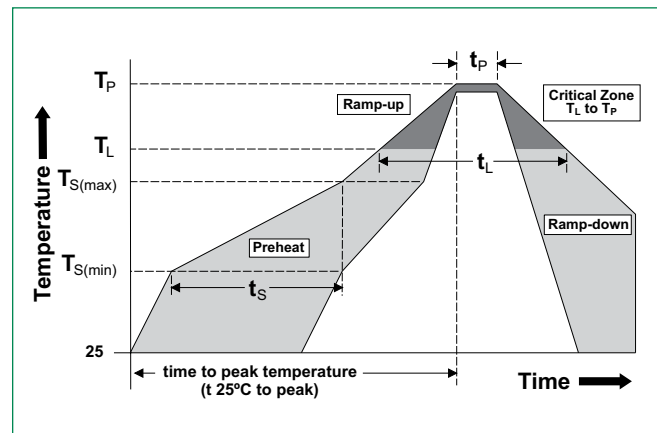
$$I = (0.80)(0.85)_{\text{RAI}} = (0.68)_{\text{RAI}}$$

### Average Time Current Curves



### Soldering Parameters

<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 seconds
<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 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °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.



# 438 Series

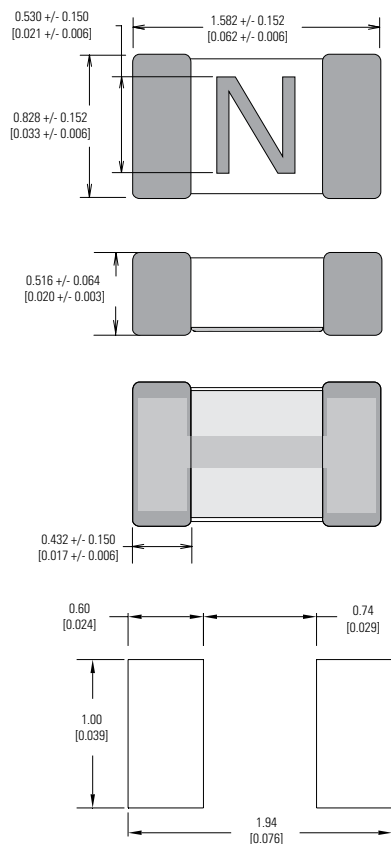
## 0603 Fast-Acting Fuse

### 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

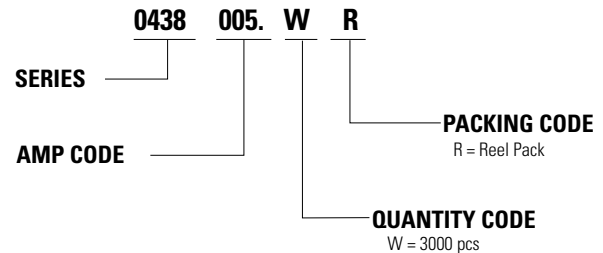
### Dimensions mm [in]



### Part Marking System

Amp Code	Marking Code	Amp Code	Marking Code
.250	D	002.	N
.375	E	02.5	O
.500	F	003.	P
.750	G	03.5	R
001.	H	004.	S
1.25	J	005.	T
01.5	K	006.	U
1.75	L		

### Part Numbering System



### Packaging

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

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