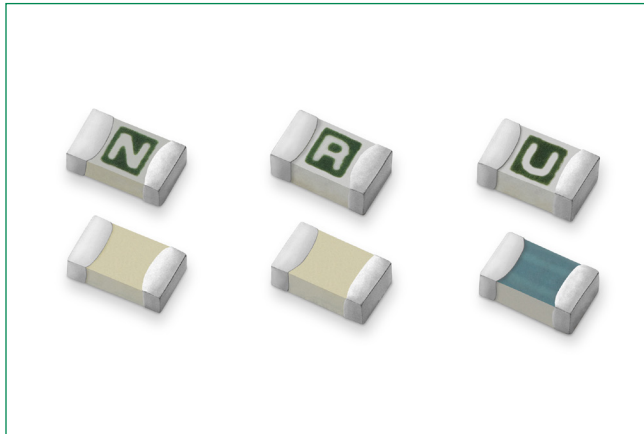


# 441 Series

## 0603 High I<sup>2</sup>t Fuse



### Description

This 100% Lead-free, RoHS compliant and Halogen-free fuse series has been designed specifically to provide over current protection to circuits that see high working ambient temperatures (up to 150°C) and high inrush currents.

The fuse design ensures excellent temperature stability and performance reliability.

This high I<sup>2</sup>t fuse series is designed to have ultra high inrush current withstand capability to avoid nuisance fuse open.

### Features & Benefits

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

### Additional Information



Resources



Accessories



Samples

### Applications

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

### Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	2A - 6A
	29862	2A - 6A

### Electrical Characteristics

% of Ampere Rating	Ampere Rating	Opening Time at 25°C
100%	2A - 6A	4 Hours Minimum
350%	2A - 6A	5 Seconds Maximum

### Electrical Specifications

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating	Nominal Resistance (Ohms) <sup>1</sup>	Nominal Melting I <sup>2</sup> t (A <sup>2</sup> Sec.) <sup>2</sup>	Nominal Voltage Drop At Rated Current (V) <sup>3</sup>	Nominal Power Dissipation At Rated Current (W)	Agency Approvals	
2	002.	32	50 A @ 32 VDC	0.0302	0.3103	0.0551	0.110	X	X
2.5	02.5	32		0.0200	0.640	0.0534	0.134	X	X
3	003.	32		0.0158	1.100	0.0531	0.159	X	X
3.5	03.5	32		0.0117	1.270	0.0468	0.164	X	X
4	004.	32		0.0097	1.710	0.0475	0.190	X	X
5	005.	32		0.0073	2.880	0.0472	0.236	X	X
6	006.	32		0.0056	4.390	0.0464	0.278	X	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.

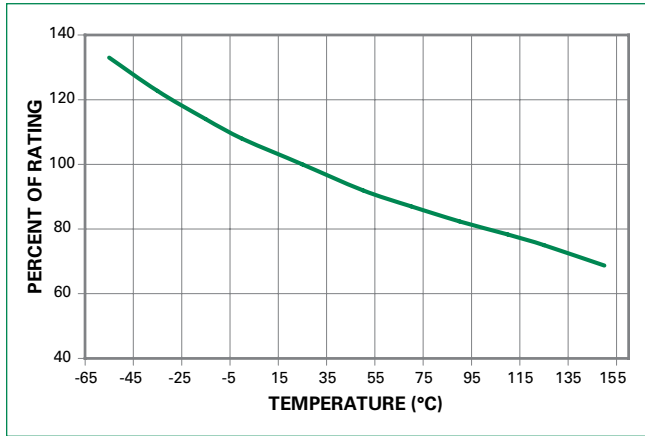
Devices designed to carry out rated current for 4 hours minimum. It is recommended that devices be operated continuously at no more than 80% rated current. See "Temperature Re-rating Curve" for additional re-rating information.

Devices designed to be mounted with marking code facing up.

# 441 Series

## 0603 High I<sup>2</sup>t Fuse

Temperature Re-rating Curve



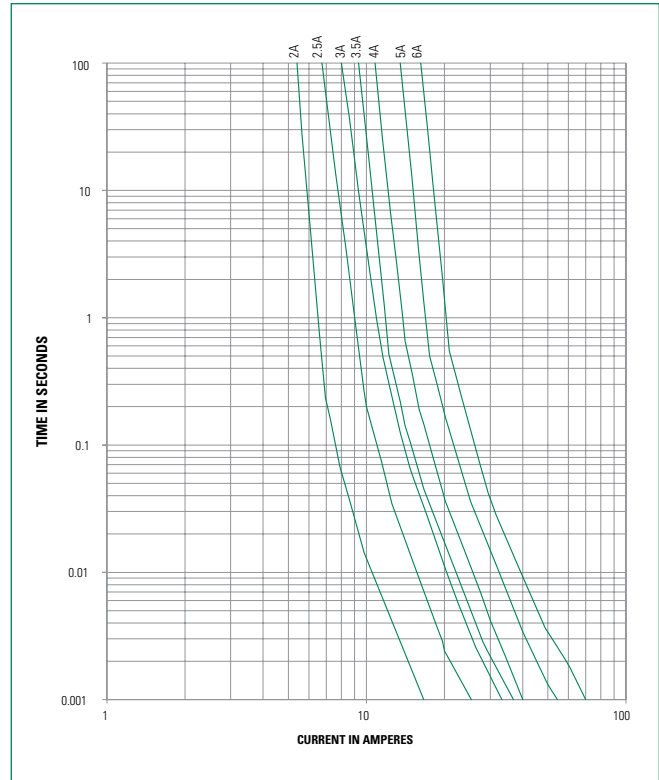
**Note:**

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

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

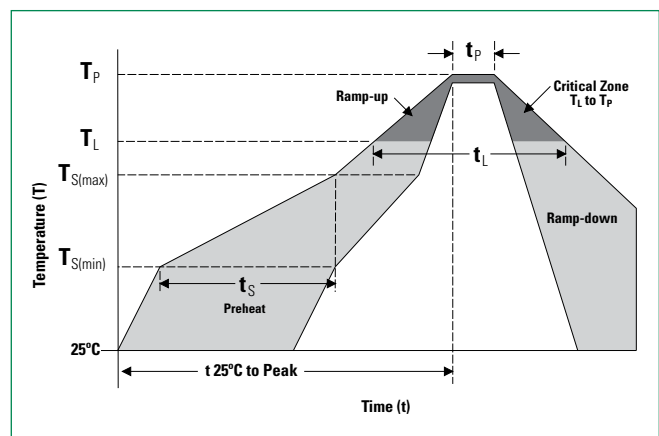
$$I = (0.80)(0.85)I_N = (0.68)I_N$$

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.



# 441 Series

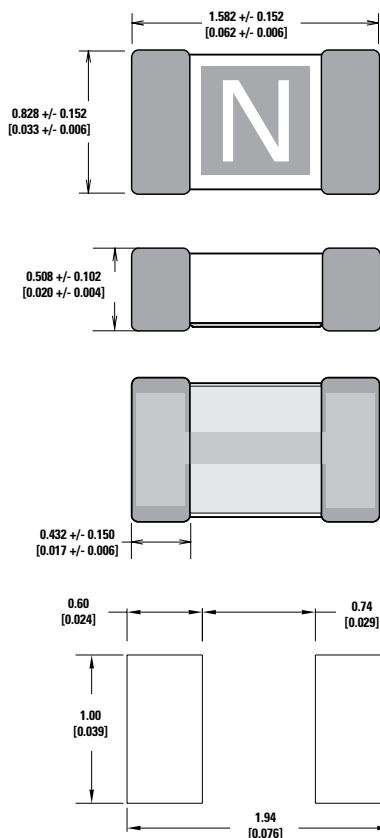
## 0603 High I<sup>2</sup>t Fuse

### 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/ECA/JEDEC J-STD-002, Condition C
<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
<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/ECA/JEDEC J-STD-002
<b>Terminal Strength</b>	IEC 60127-4

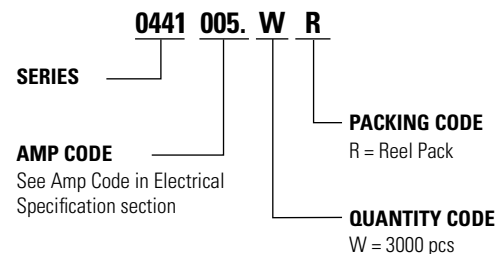
### Dimensions mm (inches)



### Part Marking System

Amp Code	Marking Code
002.	N
02.5	O
003.	P
03.5	R
004.	S
005.	T
006.	U

### Part Numbering System



### Packaging

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

**Disclaimer Notice** - Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse. 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 [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).