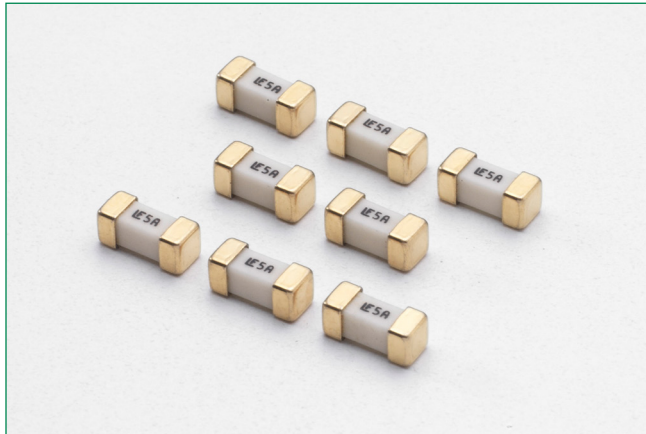


# 451/453 Series

## Very Fast-Acting Fuse



### Description

The Nano2® SMF Fuse is a very small, Wire-in-Air (WIA) square shape surface mount fuse that was designed for secondary side circuit over-current protection applications. These fuses are designed for PCB using surface mount technology.

### Features & Benefits

- Very fast-acting
- Small size
- Wide range of current rating available (0.062A to 20A)
- Wide operating temperature range
- RoHS compliant and Halogen Free
- UL Listed and Recognized to UL/CSA/NMX UL 248-1 and UL/CSA/NMX UL 248-14 (see Agency Approvals)
- Conforms to DENAN's Appendix 3
- Conforms to IEC/EN 60127-1 and IEC/EN 60127-7

### Additional Information



Resources  
451 Series



Accessories  
451 Series



Samples  
451 Series



Resources  
453 Series



Accessories  
453 Series



Samples  
453 Series

### Applications

- Notebook PC
- LCD/PDP TV
- LCD monitor
- LCD/PDP panel
- LCD backlight inverter
- Portable DVD player
- Power supply
- Networking
- PC server
- Cooling fan system
- Storage system
- Telecom system
- Wireless basestation
- White goods
- Game console
- Office Automation equipment
- Battery charging circuit protection
- Industrial equipment

### Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.062 – 20	4 hours, Minimum
200%	0.062 – 10	5 sec., Maximum
	12 – 20	20 sec., Maximum

### Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	6.3A - 20A
	29862	0.062A - 15A
	J50446731	1A, 1.25A, 2A, 2.5A, 3.15A, 4A, 5A, 7A, 8A, 10A, 12A, 20A
	NBK030205-E10480A NBK030205-E10480B NBK101105-E184655	1A-1.6A 2A-5A 6.3A - 10A
	E10480	0.062A - 5A
	NA	1A, 1.25A, 2A, 2.5A, 3.15A, 4A, 5A, 7A, 8A, 10A, 12A, 20A
	NA	1A, 1.25A, 2A, 2.5A, 3.15A, 4A, 5A, 7A, 8A, 10A, 12A, 20A

# 451/453 Series

## Very Fast-Acting Fuse

### Electrical Specifications by Item

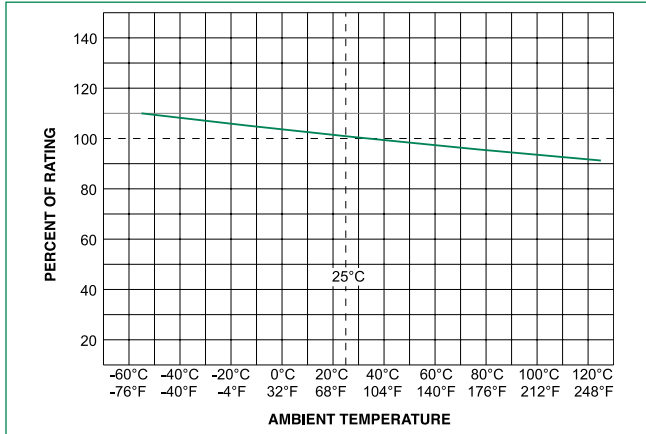
Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec)	Agency Approvals						
						UL US	SP	UL US	UL US	CE	UK CA	
.062	.062	125	50A @125VAC/VDC 300A @32VDC PSE: 100A @100VAC	5.5000	0.00019	-	x	-	x	-	-	x
.080	.080	125		4.0500	0.00033	-	x	-	x	-	-	x
.100	.100	125		3.1000	0.00138	-	x	-	x	-	-	x
.125	.125	125		1.7000	0.00286	-	x	-	x	-	-	x
.160	.160	125		1.2157	0.0048	-	x	-	x	-	-	x
.200	.200	125		0.8372	0.0089	-	x	-	x	-	-	x
.250	.250	125		0.5765	0.0158	-	x	-	x	-	-	x
.315	.315	125		0.3918	0.0311	-	x	-	x	-	-	x
.375	.375	125		0.4541	0.0442	-	x	-	x	-	-	x
.400	.400	125		0.4233	0.0551	-	x	-	x	-	-	x
.500	.500	125		0.3046	0.0824	-	x	-	x	-	-	x
.630	.630	125		0.2022	0.1381	-	x	-	x	-	-	x
.750	.750	125		0.1444	0.2143	-	x	-	x	-	-	x
.800	.800	125		0.1355	0.2654	-	x	-	x	-	-	x
1.00	001.	125		0.0780	0.6029	-	x	x	x	x	x	x
1.25	1.25	125		0.0780	0.664	-	x	x	x	x	x	x
1.50	01.5	125		0.0630	0.853	-	x	x	x	-	-	x
1.60	01.6	125		0.0580	1.060	-	x	x	x	-	-	x
2.00	002.	125		0.0367	0.530	-	x	x	x	x	x	x
2.50	02.5	125		0.0286	1.029	-	x	x	x	x	x	x
3.00	003.	125	0.0227	1.650	-	x	x	x	-	-	x	
3.15	3.15	125	0.0215	1.920	-	x	x	x	x	x	x	
3.50	03.5	125	0.0200	2.469	-	x	x	x	-	-	x	
4.00	004.	125	0.0160	3.152	-	x	x	x	x	x	x	
5.00	005.	125	0.0125	5.566	-	x	x	x	x	x	x	
6.30	06.3	125	0.0096	9.170	x	x	x	-	-	-	x	
7.00	007.	125	0.0090	10.32	x	x	x	-	x	x	x	
8.00	008.	125	0.0077	20.23	x	x	x	-	x	x	x	
10.0	010.	125	35A @125 VAC/ 50A @125 VDC 400A @32 VDC PSE: 100A @100VAC	0.0056	26.46	x	x	x	-	x	x	x
12.0	012.	65	150A @65VDC	0.0049	47.97	x	x	-	-	x	x	x
15.0	015.	65	100A @65VAC	0.0037	97.82	x	x	-	-	-	-	x
20.0	020.	65	400A @32VDC	0.00244	154	x	-	-	-	x	x	x

**Notes:**  
 - I<sup>2</sup>t calculated at 8ms.  
 - Resistance is measured at 10% of rated current, 25°C

# 451/453 Series

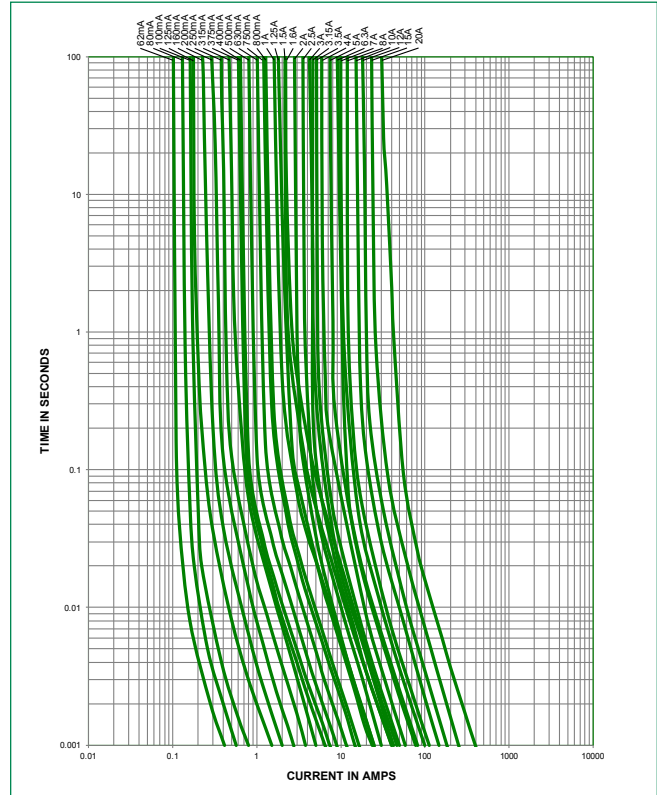
## Very Fast-Acting Fuse

Temperature Re-rating Curve



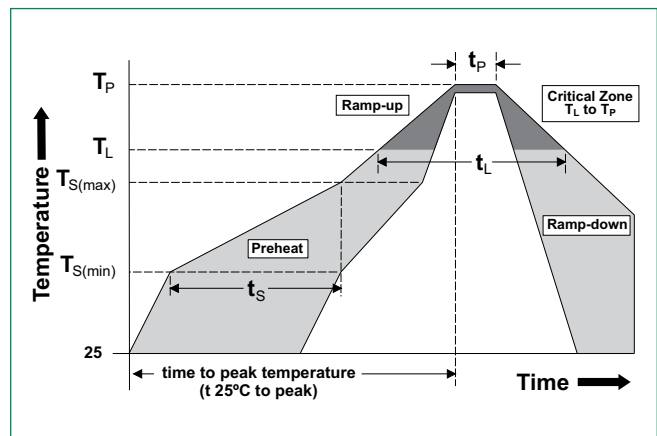
**Note:**  
 1. Re-rating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

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 secs
<b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak)</b>		5°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>		20 – 40 seconds
<b>Ramp-down Rate</b>		5°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 Parameters</b>		260°C Peak Temperature, 10 seconds max.



# 451/453 Series

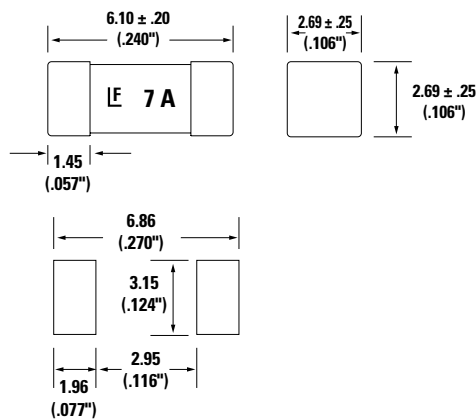
## Very Fast-Acting Fuse

### Product Characteristics

<b>Materials</b>	<b>Body:</b> Ceramic <b>Terminations:</b> Gold-Plated Caps / Sn-dipped Silver Plated Caps (451 RoHS/HF series) Silver-plated Caps (451MR RoHS ratings below 375mA and 453 RoHS Series)
<b>Product Marking</b>	Brand, Ampere Rating
<b>Operating Temperature</b>	-55°C to 125°C
<b>Moisture Sensitivity Level</b>	Level 1, J-STD-020
<b>Solderability</b>	MIL-STD-202, Method 208
<b>Insulation Resistance (after Opening)</b>	MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum)

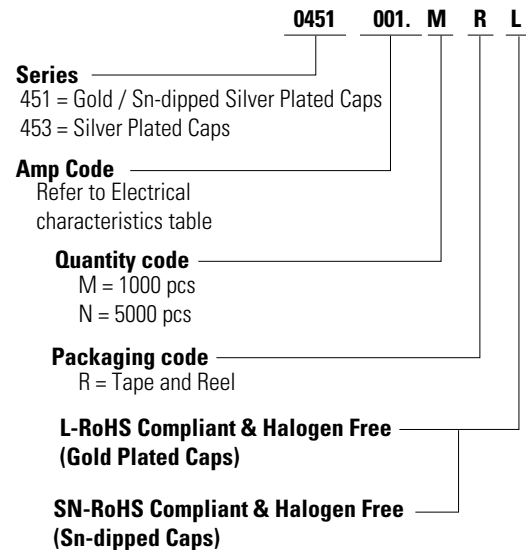
<b>Thermal Shock</b>	MIL-STD-202, Method 107, Test Condition B, 5 cycles, -65°C / +125°C, 15 minutes @ each extreme
<b>Mechanical Shock</b>	MIL-STD-202, Method 213, Test I: Deenergized. 100G's pk amplitude, sawtooth wave 6ms duration, 3 cycles XYZ+xyz = 18 shocks
<b>Vibration</b>	MIL-STD-202, Method 201: 0.03" amplitude, 10-55 Hz in 1 min. 2hrs each XYZ=6hrs
<b>Moisture Resistance</b>	MIL-STD-202, Method 106, 10 cycles
<b>Salt Spray</b>	MIL-STD-202, Method 101, Test Condition B (48hrs)
<b>Resistance to Soldering Heat</b>	MIL-STD-202, Method 210, Test condition B (10 sec at 260°C)

### Dimensions mm (inches)



Recommended pad layout

### Part Numbering System



**Note:** "L" suffix applies to 451 series only  
 - 453 series is available only as RoHS compliant version and does not require "L" suffix. Please do not include "L" suffix within 453 series ordering instructions.

### Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
12mm Tape and Reel	EIA RS-481-2 (IEC 286, part 3)	5000	NR
12mm Tape and Reel	EIA RS-481-2 (IEC 286, part 3)	1000	MR

**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).