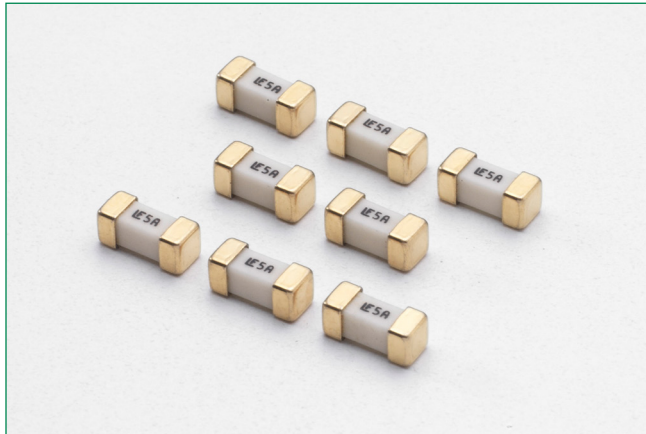


# 451/453 Series

## 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
UL US	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

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

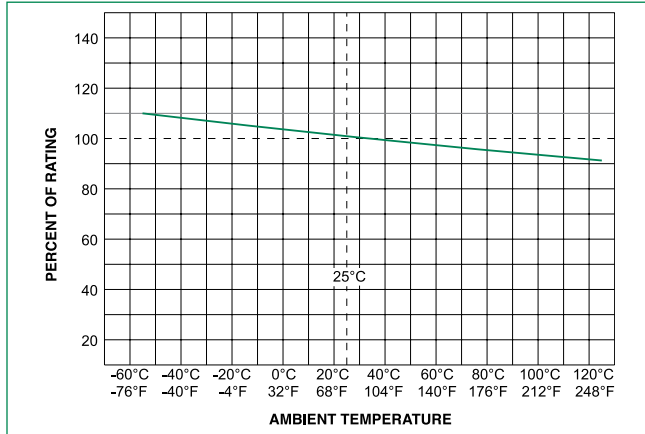
**Notes:**-  $I^2t$  calculated at 8ms.

- Resistance is measured at 10% of rated current, 25°C

# 451/453 Series

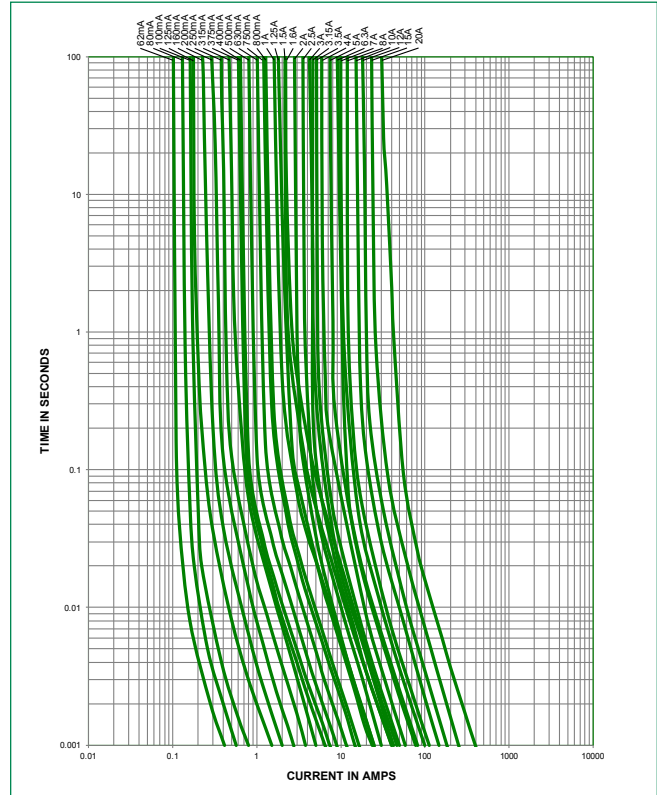
## Very Fast-Acting Fuse

Temperature Re-rating Curve



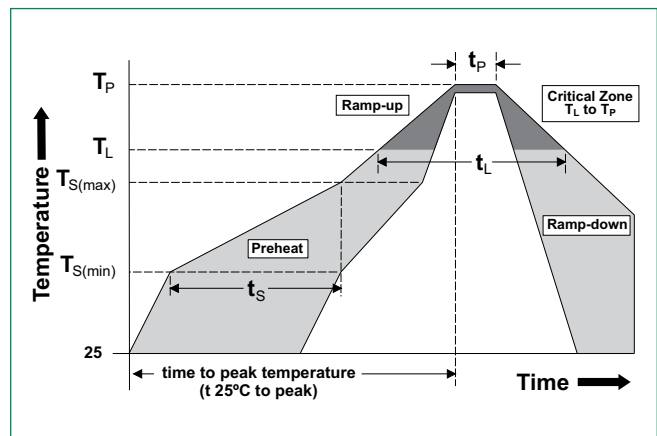
**Note:**  
1. Re-rating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

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

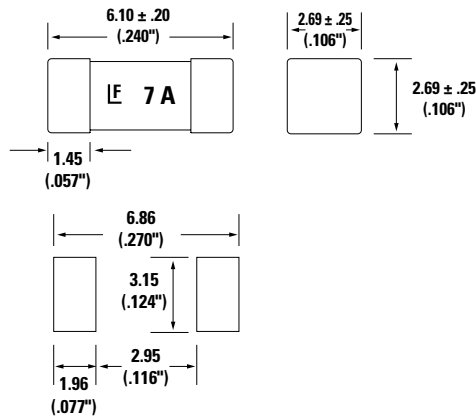
## Very Fast-Acting Fuse

### 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)

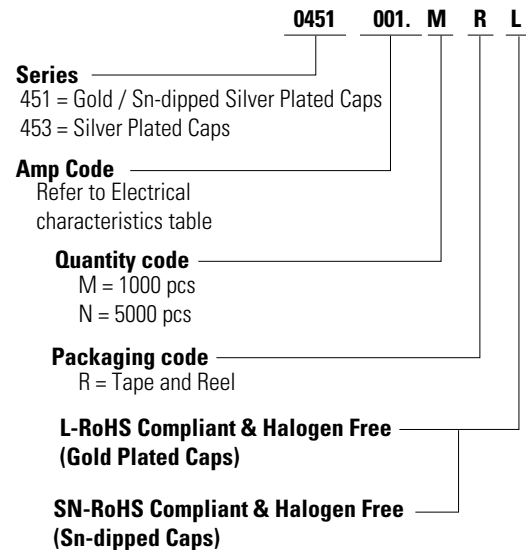
<b>Thermal Shock</b>	MIL-STD-202, Method 107, Test Condition B, 5 cycles, -65°C / +125°C, 15 minutes @ each extreme
<b>Mechanical Shock</b>	MIL-STD-202, Method 213, Test I: Deenergized. 100G's pk amplitude, sawtooth wave 6ms duration, 3 cycles XYZ+xyz = 18 shocks
<b>Vibration</b>	MIL-STD-202, Method 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



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

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