



**THE DATASHEET OF  
0451012.MRL**



## 451/453 Series Fuse







### Description

The Nano<sup>2</sup><sup>®</sup> 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

- Very fast-acting
- Small size
- Wide range of current rating available (0.062A to 20A)
- Wide operating temperature range
- Low temperature derating
- RoHS compliant and Halogen Free

### Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	6.3A - 20A
	29862	0.062A - 15A
	NBK030205-E10480A/B NBK101105-E184655	1A - 5A 6.3A - 10A
	E10480	0.062A - 5A

### 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

### Applications

- Notebook PC
- LCD/PDPTV
- 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

### Additional Information



**Datasheet**  
451 Series



**Resources**  
451 Series



**Samples**  
451 Series



**Datasheet**  
453 Series



**Resources**  
453 Series



**Samples**  
453 Series

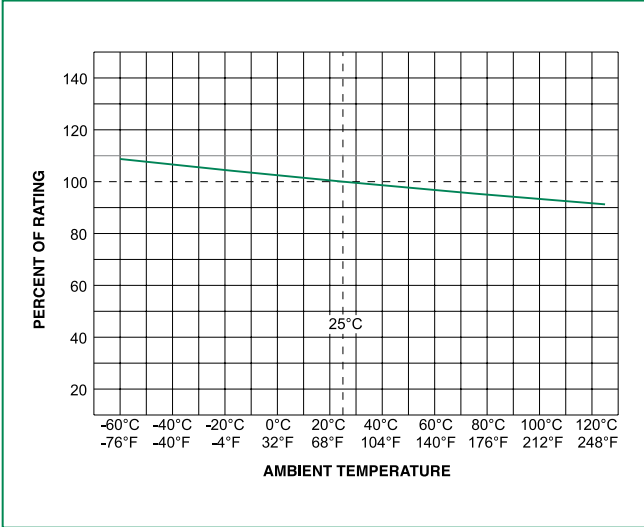
## Electrical Specifications by Item

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			
									
0.062	.062	125	50A @125VAC/VDC 300A @32VDC PSE: 100A @100VAC	5.5000	0.00019		x		x
0.080	.080	125		4.0500	0.00033		x		x
0.100	.100	125		3.1000	0.00138		x		x
0.125	.125	125		1.7000	0.00286		x		x
0.160	.160	125		1.2157	0.0048		x		x
0.200	.200	125		0.8372	0.0089		x		x
0.250	.250	125		0.5765	0.0158		x		x
0.315	.315	125		0.3918	0.0311		x		x
0.375	.375	125		0.4541	0.0442		x		x
0.400	.400	125		0.4233	0.0551		x		x
0.500	.500	125		0.3046	0.0824		x		x
0.630	.630	125		0.2022	0.1381		x		x
0.750	.750	125		0.1444	0.2143		x		x
0.800	.800	125		0.1355	0.2654		x		x
1.00	.001.	125		0.0780	0.6029		x	x	x
1.25	1.25	125		0.0780	0.664		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	50A @125VAC/VDC 10,000A @75VDC 300A @32VDC PSE: 100A @100VAC	0.0367	0.530		x	x	x
2.50	02.5	125		0.0286	1.029		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
3.50	03.5	125		0.0200	2.469		x	x	x
4.00	004.	125		0.0160	3.152		x	x	x
5.00	005.	125		0.0125	5.566		x	x	x
6.30	06.3	125	50A @125VAC/VDC 400A @32VDC PSE: 100A @100VAC	0.0096	9.170	x	x	x	
7.00	007.	125		0.0090	10.32	x	x	x	
8.00	008.	125		0.0077	20.23	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	
12.0	012.	65	150A @65VDC 100A @65VAC 400A @32VDC	0.0049	47.97	x	x		
15.0	015.	65		0.0037	97.82	x	x		
20.0	020.	65		0.00244	154	x			

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

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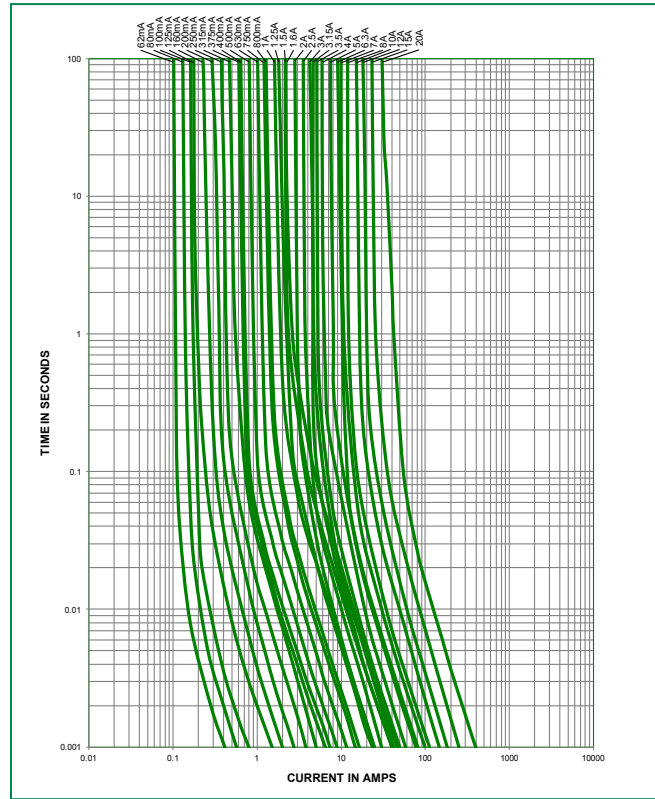
**Temperature Re-rating Curve**



Note:

1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

**Average Time Current Curves**



**Soldering Parameters**

Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (Min to Max) ( $t_s$ )	60 – 120 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		5°C/second max.
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		5°C/second max.
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_l$ )	60 – 90 seconds
Peak Temperature ( $T_p$ )		260 <sup>+0/-5</sup> °C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		5°C/second max.
Time 25°C to peak Temperature ( $T_p$ )		8 minutes max.
Do not exceed		260°C
Wave Soldering Parameters		260°C Peak Temperature, 10 seconds max.

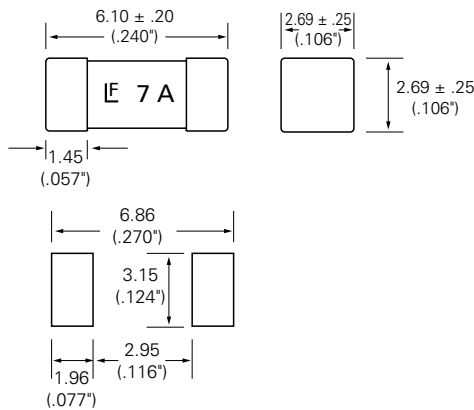


## Product Characteristics

<b>Materials</b>	<b>Body:</b> Ceramic <b>Terminations:</b> Gold-Plated Caps / Sn-dipped Silver Plated Caps (451 RoHS/HF series) SnPb Plated Caps (for 451 Non-RoHS series, 375mA-15A) 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)

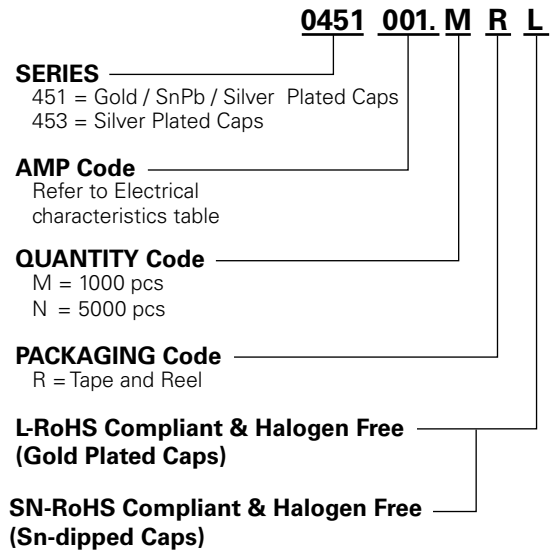
<b>Thermal Shock</b>	MIL-STD-202, Method 107, Test Condition B, 5 cycles, -65°C / +125°C, 15 minutes @ each extreme
<b>Mechanical Shock</b>	MIL-STD-202, Method 213, Test I: Deenergized. 100G's pk amplitude, sawtooth wave 6ms duration, 3 cycles XYZ+xyz = 18 shocks
<b>Vibration</b>	MIL-STD-202, Method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

- 451 series may be ordered as either "RoHS and HF" ("L" suffix) or non-RoHS (no suffix) version.
- 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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