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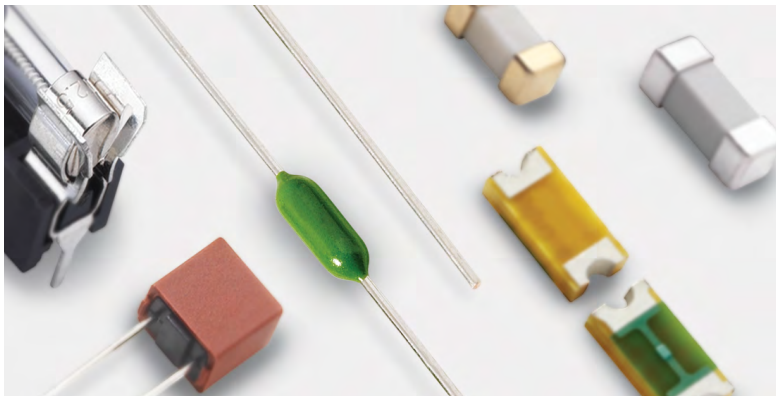

FUSE

Circuit Protection Products and Mounting Accessories

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											UL	UR	CSA	PSE	UMF			
Surface Mount:																		
Ceramic Chip		**437**	1206		•		0.25–8	125 / 63 / 32	50	–55°C to +150°C		•				•	•	•
		438	0603		•		0.25–6	32 / 24	50			•				•	•	•
		440	1206		•		1.75–8	32	50			•	•			•	•	•
		441	0603		•		2–6	32	50			•	•			•	•	•
		469	1206	•			1–8	24 / 32	24–63			•	•			•	•	•
		501	1206		•		10, 12, 15, 20	32	150			•				•	•	•
Thin Film		**466**	1206			•	0.125–5	125 / 63 / 32	50	–55°C to +90°C		•	•			•	•	
		429	1206			•	7	24	35			•	•				•	•
		468	1206	•			0.5–3	63 / 32	35–50			•	•			•	•	•
		467	0603			•	0.25–5	32	35–50			•	•			•	•	•
		494	0603	•			0.25–5	32	35–50			•	•			•	•	•
		435	0402			•	0.25–5	32	35			•	•			•	•	•
Nano²®		**448**	2410			•	0.062–15	125 / 65	35–50	–55°C to +125°C		•	•	•			•	•
		449	2410	•			0.375–5	125	50			•		•			•	•
		451 / 453	2410			•	0.062–15	125 / 65	35–50		•	•	•	•		•	•	
		452 / 454	2410	•			0.375–12	125 / 72	50			•	•	•		•	•	
		456	4012	•			20, 25, 30, 40	125	100			•		•		•	•	
		458	1206		•		1.0–10	75 / 63	50			•				•	•	
		443	4012	•			0.5–5	250	50			•				•	•	
		464	4818		•		0.5–6.3	250	100					•	•	•	•	
		465	4818	•			1–6.3	250	100					•	•	•	•	
		462	4118	•			0.500–5	350	100	–40°C to +80°C		•			•		•	
		485	4818		•		0.500–3.15	600	100	–55°C to +125°C		•				•	•	
Telelink®		**461**	4012				0.5–2.0	600	60	–55°C to +125°C		•	•			•	•	
OMNI-BLOK®		**154**	*			•	0.062–10.0	125	35–50	–55°C to +125°C		•		•		•	•	
		154T/154L/154TL	*	•			0.375–7	125	50			•		•		•	•	
Fuse and Clip Assemblies		**157**	*			•	0.062–10	125	35–50	–55°C to +125°C		•		•		•	•	
		157T	*	•			0.375–5	125	50			•		•		•	•	
		159	*				0.5–2	600	60			•				•	•	
		160	*	•			0.5–5	250	50			•				•	•	
PICO® SMF		**459**	*			•	0.062–5	125	50–300	–55°C to +125°C		•	•					
		460	*	•			0.5–5	125	50			•	•					
Flat Pak		**202**	*		•		0.062–5	250	50	–55°C to +125°C		•	•					
		203	*	•			0.25–5	250	50			•	•					
EBF		**446/447**	*		•		2.0–10.0	350	100	–40°C to +125°C		•	•					

(1) Size for these surface mount items refers to common industry length and width dimensions of the device surface area. Example: 0402 = .04"×.02"
(2) In some cases for these categories the ratings, agency approvals and specifications vary by part number and are presented here as ranges representing the whole series. Please refer to product data in our datasheets for detailed information by part number.
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FUSE
Circuit Protection Products and Mounting Accessories

		Series Name	Time-Lag (Slo-Blo®)	Medium Acting	Fast-Acting	Very Fast-Acting	Device Range [2] (Operating Current Options in Amps)	Max. Voltage Rating [2] (Volts)	Interrupting Rating at Max Voltage Rating [2] (Amps)	Operating Temperature Range	Agency Approvals [2]															RoHS Compliant	Lead Free
											Americas						Europe					Asia					
											UL	UR	CSA	QPL	cURus	UMF	CE	VDE	TUV	BSI	Semko	PSE	K	CCC	CQC		
Radial Leaded / Socket:																												
Micro™ / TR3®		**262/268/269**				•	0.002–5	125	10,000	–55°C to +125°C		•	•	•													
		272/278/				•	0.002–5	125	10,000	–55°C to +125°C		•	•	•													
		273/274/279				•	0.002–5	125	10,000	–55°C to +85°C																	
		303			•		0.5–5	125	50	–55°C to +70°C	•		•													•	•
TR5®		**370**			•		0.4–6.3	250	35–50			•						•			•	•		•		•	•
		372	•				0.4–6.3	250	35–50			•						•			•	•	•	•	•	•	•
		373			•		0.5–10	250	50	–40°C to +85°C	•		•													•	•
		374	•				0.5–10	250	50		•		•													•	•
		382	•				1–10	250	100			•						•			•	•	•	•	•	•	•
		383	•				1–10	300	50–100			•						•				•				•	•
TE5®		**369**	•				1–6.3	300	50			•										•				•	•
		385	•				0.35–1.5	125	50			•														•	•
		389	•				0.6	250	10																	•	•
		391			•		0.125–4	65	50			•														•	•
		392	•				0.8–6.3	250	25–63			•						•			•	•	•		•	•	•
		395			•		0.05–6.3	125	100	–40°C to +85°C	•											•				•	
		396	•				0.05–6.3	125	100		•											•				•	•
		397	•				0.35–1.5	125	50		•															•	•
		398		•			0.125–4	65	50			•														•	•
		399	•				0.125–4	65	50			•														•	•
		400	•				0.5–6.3	250	130			•						•				•				•	•
		804	•				0.8–6.3	250	150	–40°C to +125°C						•		•				•	•		•	•	•
		808			•		2–5	250	100	–40°C to +85°C		•														•	•
TE7®		**807**	•				0.8–6.3	300	100	–40°C to +125°C					•							•	•			•	•

Fuseholder Type		Series Name	Fuse Type	Fuse Series	Circuit Connection Method	Series
Radial Leaded Fuse Holders:						
Panel Mount Fuse Enclosures		**281/282**	Micro™ / TR3®	262 / 268 269 / 272 273 / 274 278 / 279	Wire Connector Terminals	282001 Front mt. Neoprene 282007 Front mt. Conductive 282002 Rear mt. Neoprene 282008 Rear mt. Conductive 280004 32V indicating
Circuit Board Mount Fuse Enclosures		**281/556/557**	Micro™ / TR3®		Thru-Hole	281005 Vertical Silver 281007 Horizontal Silver 281008 Vertical Tin 281010 Horizontal Tin
Panel Mount Fuse Enclosures		**570/**	TE5®/ TR5®	303 / 369 370 / 372 373 / 374 382 / 383 385 / 392 395 / 396 397 / 398 400 / 662 663 / 664 665 / 804 807 / 808	Wire Connector Terminals	570 Series
Circuit Board Mount Fuse Enclosures		**571/576**	TE5®/ TR5®		Thru-Hole	571 0000 000 576 Series
		562/564	TE5®/ TR5®		Thru-Hole Surface Mount	562 Series 564 Series
		559/560	TE5®/ TR5®		Thru-Hole	559/560 Series

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		Series Name	Time-Lag (Slo-Blo®)	Medium Acting	Fast-Acting	Very Fast-Acting	Device Range[2] (Operating Current Options in Amps)	Max. Voltage Rating[2] (Volts)	Interrupting Rating at Max Voltage Rating[2] (Amps)	Operating Temperature Range	Agency Approvals[2]															RoHS Compliant	Lead Free
											Americas						Europe					Asia					
											UL	UR	CSA	QPL	cURus	UMF	CE	VDE	TUV	BSI	Semko	PSE	K	CCC	COC		
Axial Leaded / Cartridge:																												
PICO / PICO II Axial		**251/253**				•	0.062–15	125	300DC / 50AC	–55°C to +125°C		•	•	•					•			•				•	
		275				•	20–30	32	300DC / 50AC			•	•														•	
		263				•	0.062–5	250	50			•	•									•				•	
		471	•				0.5–5	125	50			•	•									•				•	
		472	•				0.5–5	125	50			•														•	
		473	•				0.375–7	125	50			•	•									•				•	
		265/266/267				•	0.062–15	125	300DC / 50AC			•	•	•												•	
3.6×10 mm		**874**				•	0.1–10	250	50	–55°C to +125°C	•															•	•
		875	•				0.1–10	250	50		•															•	•
		876				•	0.125–5	250	35–50			•						•								•	•
		877	•				2–6.3	250	35–63			•						•								•	•
4.5×14.5 mm (2AG)		**208**			•		0.125–10	350	100	–55°C to +125°C		•			•		•					•				•	•
		209	•				0.25–7	350	100			•			•		•					•				•	•
		220	Special Fuse				0.3–7	250 / 300 / 350	35–100		•	•	•				•					•				•	•
		2205	•				0.25–2.5	250	35			•	•				•									•	•
		224/225			•		0.375–10	250 / 125	35–500		•	•	•				•					•				•	•
		229/230	•				0.25–7	250 / 125	35–400		•	•	•				•					•				•	•
5×20 mm		**201P**																									
		217			•		0.032–15	250	35–150			•	•				•	•		•	•	•	•	•		•	•
		218	•				0.032–16	250	35–100			•	•				•	•		•	•	•	•	•		•	•
		213	•				0.2–6.3	250	35–63			•	•				•	•		•	•	•		•		•	•
		219XA	•				0.04–6.3	250	150			•	•				•	•		•	•	•		•		•	•
		216			•		0.05–16	250	750–1500			•	•				•	•		•	•	•	•	•		•	•
		216SP			•		1–10	250	1500			•	•				•	•				•			•		
		215	•				0.125–20	250	400 / 1500			•	•				•	•		•	•	•	•	•		•	•
		215SP	•				1–10	250	1500			•	•				•	•				•			•		
		232		•			1–10	250 / 125	300 / 10,000								•					•	•			•	•
		235			•		0.1–7	250 / 125	35–10,000		•		•				•					•	•			•	•
		233		•			1–10	125	10,000		•		•				•					•	•			•	•
		234		•			1–10	250	100–200		•		•				•					•	•			•	•
		239	•				0.08–7	250 / 125	35–10,000		•		•				•					•	•			•	•
		285	•				0.125–20	250	400–1500													•				•	•
		477	•				0.5–16	400DC / 500AC	100–1500			•			•		•				•	•				•	•
		977	•				0.5–16	450DC / 500AC	200 / 100								•				•	•				•	•
6.3×32 mm (3AG/3AB)		**312/318**			•		0.062–35	250 / 32	35–300	–55°C to +125°C	•	•	•		•		•					•	•			•	•
		313/315	•				0.01–30	250 / 125 / 32	35–300		•	•	•				•					•	•			•	•
		314/324			•		0.375–40	250	35–1000		•	•	•				•					•	•			•	•
		322				•	12–30	65	200–1000			•			•		•					•				•	
		332				•	1- 10	250	100 / 200			•			•		•					•				•	•
		325/326	•				0.01–30	250	100–600		•	•	•				•					•	•			•	•
		328																									
		505			•		10–30	450 / 500	20,000–50,000			•			•		•					•				•	•
		506			•		15–20	600DC	10,000			•					•					•				•	•
		508	1000VAC / DC High Voltage				0.315–1	1000	10,000						•		•									•	•
		688	70VDC High Voltage																								

(1) Size for these surface mount items refers to common industry length and width dimensions of the device surface area. Example: 0402 = .04"×.02"
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FUSE
Circuit Protection Products and Mounting Accessories

Fuseholder Type		Series Name	Fuse Type	Fuse Series	Circuit Connection Method	Series
Cartridge Fuse Holders:						
Circuit Board Mount Fuse Enclosures		**810/811/813/814**	6.3×32 mm (3AB/3AG)	312 / 313 / 314 / 322 326 / 332 / 373 / 505 / 506 / 508 / 605	Thru-Hole	810/811/813/814
			5×20 mm	213 / 215 / 216 / 217 / 218 / 219XA 232 / 233 / 234 / 235 / 239 / 285 377 / 477 / 617 / 618	Thru-Hole	810/811/813/814
		830/831/834			Thru-Hole	830/831/834
		345			Thru-Hole	345121 Shocksafe
			6.3×32 mm (3AB/3AG)	312 / 313 / 314 / 322 326 / 332 / 373 / 505 / 506 / 508 / 605	Thru-Hole	345101 Shocksafe
		596/583	5×20 mm	213 / 215 / 216 / 217 218 / 219XA / 232 / 233 234 / 235 / 239 / 285 377 / 477 / 617 / 618	Thru-Hole	596/583
		652				652 Series
Panel Mount Fuse Enclosures		**345**	6.3×32 mm (3AB/3AG)	312 / 313 / 314 / 322 326 / 332 / 373 / 505 / 506 / 508 / 605	Wire Connector Terminals	3453 Series Int. Shocksafe 345 Series Int. Shocksafe (old)
			5×20 mm	213 / 215 / 216 / 217 218 / 219XA / 232 / 233 234 / 235 / 239 / 285 377 / 477 / 617 / 618		345 Shocksafe 3455 Int. Shocksafe
			4.5×14.5 mm (2AG)	208 / 209 225 / 229		3452 series Int. Shocksafe 345 series Int. Shocksafe (old)
		800/801/802/803	5×20 mm	213 / 215 / 216 / 217 218 / 219XA / 232 / 233 234 / 235 / 239 / 285 377 / 477 / 617 / 618		800 / 801 / 802 Series
			6.3×32 mm (3AB/3AG)	312 / 313 / 314 / 322 326 / 332 / 373 / 505 / 506 / 508 / 605	Wire Connector Terminals	800 Series Shocksafe 801 / 802 / 803-01 Series
		820/821/823/824	5×20 mm	213 / 215 / 216 / 217 218 / 219XA / 232 / 233 234 / 235 / 239 / 285 377 / 477 / 617 / 618		820/ 820-20 Series Mini Shocksafe 821 Series 823 Series Snap-in 824 / 824 - 20 Series

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Fuseholder Type		Series Name	Fuse Type	Fuse Series	Circuit Connection Method	Series
Cartridge Fuse Clips:						
Fuse Clips		**102/122**				
		100/102/122	6.3×32mm (3AB/3AG)	312 / 313 / 314 / 322 / 326 332 / 373 / 505 / 506 / 508 / 605	Thru-Hole	102080 / 122090 / 100058
		100/445/030/520	5×20 mm		Thru-Hole	100 / 04450001 / 00300210 / 5200001
		111	4.5×14.5 mm (2AG)		Thru-Hole	111501 / 111506
					Surface Mount	111505
			5×20 mm		Thru-Hole	111 Series
		105/106/125				
		101/102/105/107/109/121/125/127/129 Rivet/Eyelet Mount	6.3×32mm (3AB/3AG)		Wire Connector Terminals	101001 / 101002 / 101003 / 102064 121001 / 121002 / 121004
		520/521/102071	5×20 mm		Thru-Hole	52000001009 / 52100001009
			6.3×32mm (3AB/3AG)			102071
		518	5×20 mm		Thru-Hole	51800001009
			6.3×32mm (3AB/3AG)			
		111/519	5×20 mm		Thru-Hole	111 Series / 51900001009
		523	5×20 mm		Thru-Hole	523 Series
Cartridge Fuse Blocks:						
Fuse Blocks		**520**	5×20 mm		Thru-Hole	520 002, 520 101
					Quick Connect	520 003, 520 005
					Wire Connector Terminals	520 004
		254	4.5×14.5 mm (2AG)		Thru-Hole	254 101 / 254 121
					Quick Connect	254 201 - 208
					Wire Connector Terminals	254 001 - 008
		354	6.3×32mm (3AB/3AG)		Wire Connector Terminals	354 Series
		646	5×20 mm		Thru-Hole	646 Series
		649	5×20 mm		Thru-Hole	649 Series
		656	5×20 mm		Thru-Hole	656 Series
		658	5×20 mm		Surface Mount	658 Series
		356/359	6.3×32mm (3AB/3AG)		Wire Connector Terminals	356 / 359 Series
In-Line Cartridge Fuse Holders:						
In- Line Fuseholders		**155**	6.3×32mm (3AB/3AG)		Wire	155 Series
		155				
		150	5×20 mm		Wire	150274
			4.5×14.5 mm (2AG)			

	Series Name	Device Range[2] (Operating Current Options in Amps)	Max. Voltage Rating[2] (Volts)	Interrupting Rating at Max Voltage Rating[2] (Amps)	Operating Temperature Range	Agency Approvals[2]															RoHS Compliant
						Americas						Europe					Asia				
						UL	UR	CSA	OPL	cURus	UMF	CE	VDE	TUV	BSI	Semko	PSE	K	CCC	CCC	
Special Application Fuses:																					
	242				–40°C to 125°C	•															•
	259				–55°C to 90°C	•															•
	PICO 259-UL913				–55°C to 125°C	•															•
	481				–55°C to 125°C	•															•
	482				–40°C to 125°C	•															•

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Fuse Characteristics, Terms and Consideration Factors

The purpose of this introductory section is to promote a better understanding of both fuses and common application details within circuit design.

The fuses to be considered are current sensitive devices designed to serve as the intentional weak link in the electrical circuit. Their function is to provide protection of discrete components, or of complete circuits, by reliably melting under current overload conditions. This section will cover some important facts about fuses, selection considerations and standards.

The application guidelines and product data in this guide are intended to provide technical information that will help with application design. *The fuse parameters and application concepts presented should be well understood in order to properly select a fuse for a given application.*

Since these are only a few of the contributing parameters, application testing is strongly recommended and should be used to verify performance in the circuit / application.

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AMBIENT TEMPERATURE: Refers to the temperature of the air immediately surrounding the fuse and is not to be confused with "room temperature." The fuse ambient temperature is appreciably higher in many cases, because it is enclosed (as in a panel mount fuseholder) or mounted near other heat producing components, such as resistors, transformers, etc.

BREAKING CAPACITY: Also known as interrupting rating or short circuit rating, this is the maximum approved current which the fuse can safely break at rated voltage. Please refer to the interrupting rating definition of this section for additional information.

CURRENT RATING: The nominal amperage value of the fuse. It is established by the manufacturer as a value of current which the fuse can carry, based on a controlled set of test conditions (See RE-RATING).

Catalog Fuse part numbers include series identification and amperage ratings. Refer to the FUSE SELECTION GUIDE section for guidance on making the proper choice.

RE-RATING: For 25ºC ambient temperatures, it is recommended that fuses be operated at no more than 75% of the nominal current rating established using the controlled test conditions. These test conditions are part of UL/CSA/ANCE (Mexico) 248-14 "Fuses for Supplementary Overcurrent Protection," whose primary objective is to specify common test standards necessary for the continued control of manufactured items intended for protection against fire, etc. Some common variations of these standards include: fully enclosed fuseholders, high contact resistances, air movement, transient spikes, and changes in connecting cablesize (diameter and length). Fuses are essentially temperature-sensitive devices. Even small variations from the controlled test conditions can greatly affect the predicted life of a fuse when it is loaded to its nominal value, usually expressed as 100% of rating.

The circuit design engineer should clearly understand that the purpose of these controlled test conditions is to enable fuse manufacturers to maintain unified performance standards for their products, and he must account for the variable conditions of his application. To compensate for these variables, the circuit design engineer who is designing for trouble-free, long-life fuse protection in his equipment generally loads his fuse not more than 75% of the nominal rating listed by the manufacturer,keeping in mind that overload and short circuit protection must be adequately provided for.

The fuses under discussion are temperature-sensitive devices whose ratings have been established in a 25ºC ambient. The fuse temperature generated by the current passing through the fuse increases or decreases with ambient temperature change.

The ambient temperature chart in the FUSE SELECTION GUIDE section illustrates the effect that ambient temperature has on the nominal current rating of a fuse. Most traditional Slo-Blo® Fuse designs use lower melting temperature materials and are, therefore, more sensitive to ambient temperature changes.

DIMENSIONS: Unless otherwise specified, dimensions are in inches.

The fuses in this catalog range in size from the approx. 0402 chip size (.041"L×.020"W×.012"H) up to the 5 AG, also commonly known as a"MIDGET" fuse (13/32" Dia.×11/2" Length). As new products were developed throughout the years, fuse sizes evolved to fill the various electrical circuit protection needs.

The first fuses were simple, open-wire devices, followed in the 1890's by Edison's enclosure of thin wire in a lamp base to make the first plug fuse. By 1904, Underwriters Laboratories had established size and rating specifications to meet safety standards. The renewable type fuses and automotive fuses appeared in 1914, and in 1927 Littelfuse started making very low amperage fuses for the budding electronics industry.

The fuse sizes in following chart began with the early "Automobile Glass" fuses, thus the term "AG". The numbers were applied chronologically as different manufacturers started making a new size: "3AG," for example, was the third size placed on the market. Other non-glass fuse sizes and constructions were determined by functional requirements, but they still retained the length or diameter dimensions of the glass fuses. Their designation was modified to AB in place of AG, indicating that the outer tube was constructed from Bakelite, fibre, ceramic, or a similar material other than glass. The largest size fuse shown in the chart is the 5AG, or "MIDGET," a name adopted from its use by the electrical industry and the National Electrical Code range which normally recognizes fuses of 9/16"×2" as the smallest standard fuse in use.

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Fuse Characteristics, Terms and Consideration Factors (continued)

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FUSE SIZES				
SIZE	DIAMETER (Inches)		LENGTH (Inches)	
1AG	1/4	.250	5/8	.625
2AG	–	.177	–	.588
3AG	1/4	.250	1 ¼	1.25
4AG	9/32	.281	1 ¼	1.25
5AG	13/32	.406	1 ½	1.50
7AG	1/4	.250	7/8	.875
8AG	1/4	.250	1	1

TOLERANCES: The dimensions shown in this catalog are nominal. Unless otherwise specified, tolerances are applied as follows. Tolerances do not apply to lead lengths:

± .010" for dimensions to 2 decimal places.

± .005" for dimensions to 3 decimal places.

Contact Littelfuse should you have questions regarding metric system and fractional tolerances.

FUSE CHARACTERISTICS: This characteristic of a fuse design refers to how rapidly it responds to various current overloads. Fuse characteristics can be classified into three general categories: very fast-acting, fast-acting, or Slo-Blo® Fuse. The distinguishing feature of Slo-Blo® fuses is that these fuses have additional thermal inertia designed to tolerate normal initial or start-up overload pulses.

FUSE CONSTRUCTION: Internal construction may vary depending on ampere rating. Fuse photos in this catalog show typical construction of a particular ampere rating within the fuse series.

FUSEHOLDERS: In many applications, fuses are installed in fuseholders. These fuses and their associated fuseholders are not intended for operation as a "switch" for turning power "on" and "off ".

INTERRUPTING RATING: Also known as breaking capacity or short circuit rating, the interrupting rating is the maximum approved current which the fuse can safely interrupt at rated voltage. During a fault or short circuit condition, a fuse may receive an instantaneous overload current many times greater than its normal operating current. Safe operation requires that the fuse remain intact (no explosion or body rupture) and clear the circuit.

Interrupting ratings may vary with fuse design and range from 35 amperes for some 250VAC metric size (5×20mm) fuses up to 200,000 amperes for the 600VAC KLK series. Information on other fuse series can be obtained from the Littelfuse

Fuses listed in accordance with UL/CSA/ANCE 248 are required to have an interrupting rating of 10,000 amperes at 125V, with some exceptions (See STANDARDS section) which, in many applications, provides a safety factor far in excess of the short circuit currents available.

NUISANCE OPENING: Nuisance opening is most often caused by an incomplete analysis of the circuit under consideration.

Of all the "Selection Factors" listed in the FUSE SELECTION GUIDE, special attention must be given to items 1, 3, and 6, namely, normal operating current, ambient temperature, and pulses.

For example, one prevalent cause of nuisance opening in conventional power supplies is the failure to adequately consider the fuse's nominal melting I^2t rating. The fuse cannot be selected solely on the basis of normal operating current and ambient temperature. In this application, the fuse's nominal melting I^2t rating must also meet the inrush current requirements created by the input capacitor of the power supply's smoothing filter.

The procedure for converting various waveforms into I^2t circuit demand is given in the FUSE SELECTION GUIDE. For trouble-free, long-life fuse protection, it is good design practice to select a fuse such that the I^2t of the waveform is no more than 20% of the nominal melting I^2t rating of the fuse. Refer to the section on PULSES in the FUSE SELECTION GUIDE.

RESISTANCE: The resistance of a fuse is usually an insignificant part of the total circuit resistance. Since the resistance of fractional amperage fuses can be several ohms, this fact should be considered when using them in low-voltage circuits. Actual values can be obtained by contacting Littelfuse.

Most fuses are manufactured from materials which have positive temperature coefficients, and, therefore, it is common to refer to cold resistance and hot resistance (voltage drop at rated current), with actual operation being somewhere in between.

Cold resistance is the resistance obtained using a measuring current of no more than 10% of the fuse's nominal rated current. Values shown in this publication for cold resistance are nominal and representative. The factory should be consulted if this parameter is critical to the design analysis.

Hot resistance is the resistance calculated from the stabilized voltage drop across the fuse, with current equal to the nominal rated current flowing through it. Resistance data on all Littelfuse products are available on request. Fuses can be supplied to specified controlled resistance tolerances at additional cost.

SOLDERING RECOMMENDATIONS: Since most fuse constructions incorporate soldered connections, caution should be used when installing those fuses intended to be soldered in place. The application of excessive heat can reflow the solder within the fuse and change its rating. Fuses are heat-sensitive components similar to semi-conductors, and the use of heat sinks during soldering is often recommended.

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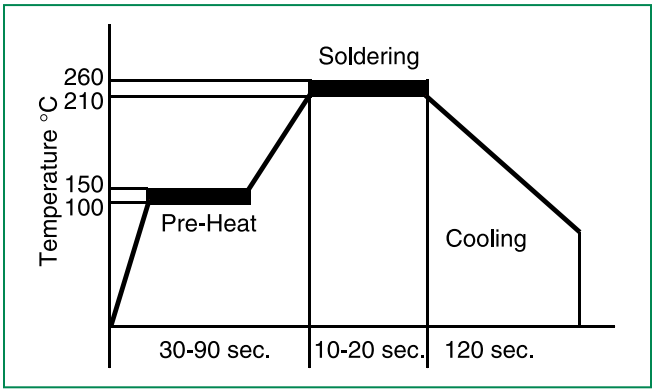
Fuse Characteristics, Terms and Consideration Factors (continued)



Lead-Free Soldering Parameters (most instances):
Wave Solder — 260°C, 10 seconds max
Reflow Solder — 260°C, 30 seconds max

TEST SAMPLING PLAN: Because compliance with certain specifications requires destructive testing, these tests are selected on a statistical basis for each lot manufactured.

TIME-CURRENT CURVE: The graphical presentation of the fusing characteristic, time-current curves are generally average curves which are presented as a design aid but are not generally considered part of the fuse specification. Time-current curves are extremely useful in defining a fuse, since fuses with the same current rating can be represented by considerably different time-current curves. The fuse specification typically will include a life requirement at 100% of rating and maximum opening times at overload points (usually 135% and 200% of rating depending on fuse standard characteristics). A time-current curve represents average data for the design; how ever, there may be some differences in the values for any one given production lot. Samples should be tested to verify performance, once the fuse has been selected.

UNDERWRITERS LABORATORIES: Reference to "Listed by Underwriters Laboratories" signifies that the fuses meet the requirements of UL/CSA/ANCE 248-14 "Fuses for Supplementary Overcurrent Protection". Some 32 volt fuses (automotive) in this catalog are listed under UL Standard 275. Reference to "Recognized under the Component Program of Underwriters Laboratories" signifies that the item is recognized under the component program of Underwriters Laboratories and application approval is required.

VOLTAGE RATING: The voltage rating, as marked on a fuse, indicates that the fuse can be relied upon to safely interrupt its rated short circuit current in a circuit where the voltage is equal to, or less than, its rated voltage.

This system of voltage rating is covered by N.E.C. regulations and is a requirement of Underwriters Laboratories as a protection against fire risk. The standard voltage ratings used by fuse manufacturers for most small-dimension and midget fuses are 32, 63, 125, 250 and 600.

In electronic equipment with relatively low output power supplies, with circuit impedance limiting short circuit currents to values of less than ten times the current rating of the fuse, it is common practice to specify fuses with 125 or 250 volt ratings for secondary circuit protection of 500 volts or higher.

As mentioned previously (See RE-RATING), fuses are sensitive to changes in current, not voltage, maintaining their "status quo" at any voltage up to the maximum rating of the fuse. It is not until the fuse element melts and arcing occurs that the circuit voltage and available power become an issue. The safe interruption of the circuit, as it relates to circuit voltage and available power, is discussed in the section on INTERRUPTING RATING.

To summarize, a fuse may be used at any voltage that is less than its voltage rating without detriment to its fusing characteristics. Please contact the factory for applications at voltages greater than the voltage rating.

DERIVATION OF NOMINAL MELTING I^2t: Laboratory tests are conducted on each fuse design to determine the amount of energy required to melt the fusing element. This energy is described as nominal melting I^2t and is expressed as "Ampere Squared Seconds" (A^2 sec.).

A pulse of current is applied to the fuse, and a time measurement is taken for melting to occur. If melting does not occur within a short duration of about 8 milliseconds (0.008 seconds) or less, the level of pulse current is increased. This test procedure is repeated until melting of the fuse element is confined to within about 8 milliseconds.

The purpose of this procedure is to assure that the heat created has insufficient time to thermally conduct away from the fuse element. That is, all of the heat energy (I^2t) is used, to cause melting. Once the measurements of current (I) and time (t) are determined, it is a simple matter to calculate melting I^2t. When the melting phase reaches completion, an electrical arc occurs immediately prior to the "opening" of the fuse element.

$$\text{Clearing } I^2t = \text{Melting } I^2t + \text{arcing } I^2t$$

The nominal I^2t values given in this publication pertain to the melting phase portion of the "clearing" or "opening". Alternatively the time can be measured at 10 times of the rated current and the I^2t value is calculated like above.

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Fuse Selection Checklist

The application guidelines and product data in this guide are intended to provide technical information that will help with application design. Since these are only a few of the contributing parameters, application testing is strongly recommended and should be used to verify performance in the circuit/application.

Many of the factors involved with fuse selection are listed below. For additional assistance with choosing fuses appropriate to you requirements, contact your Littelfuse products reprentative.:

Selection Factors

1. **Normal operating current**
2. **Application voltage (AC or DC)**
3. **Ambient temperature**
4. **Overload current and length of time in which the fuse must open**
5. **Maximum available fault current**
6. **Pulses, Surge Currents, Inrush Currents, Start-up Currents, and Circuit Transients**
7. **Physical size limitations, such as length, diameter, or height**
8. **Agency Approvals required, such as UL, CSA, VDE, METI, MITI or Military**
9. **Fuse features (mounting type/form factor, ease of removal, axial leads, visual indication, etc.)**
10. **Fuseholder features, if applicable and associated re-rating (clips, mounting block, panel mount, PC board mount, R.F.I. shielded, etc.)**
11. **Application testing and verification prior to production**

Littelfuse is at your service to help solve your electrical protection problems. When contacting Littelfuse sales engineers, please have all the requirements of your applications available. Requests for quotes or assistance in designing or selecting special types of circuit protection components for your particular applications are also welcome. In the absence of special requirements, Littelfuse reserves the right to make appropriate changes in design, process, and manufacturing location without prior notice.

1. NORMAL OPERATING CURRENT: The current rating of a fuse is typically derated 25% for operation at 25ºC to avoid nuisance blowing. For example, a fuse with a current rating of 10A is not usually recommended for operation at more than 7.5A in a 25ºC ambient. For additional details, see RE-RATING in the previous section and AMBIENT TEMPERATURE below.

2. APPLICATION VOLTAGE: The voltage rating of the fuse must be equal to, or greater than, the available circuit voltage. For exceptions, see VOLTAGE RATING.

3. AMBIENT TEMPERATURE: The current carrying capacity tests of fuses are performed at 25ºC and will be affected by changes in ambient temperature. The higher the ambient temperature, the hotter the fuse will operate, and the shorter its life. Conversely, operating at a lower temperature will prolong fuse life. A fuse also runs hotter as the normal operating current approaches or exceeds the rating of the selected fuse. Practical experience indicates fuses at **room temperature** should last indefinitely, if operated at no more than 75% of catalog fuse rating.

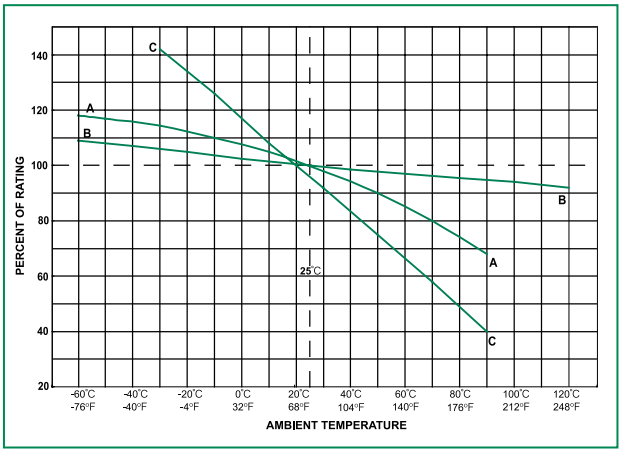
Ambient temperature effects are in addition to the normal re-rating, see example. Example: Given a normal operating current of 2.25 amperes in an application using a 229 series fuse at room temperature, then:

$$\text{Catalog Fuse Rating} = \frac{\text{Normal Operating Current}}{0.75}$$

- or -

$$\frac{2.25 \text{ Amperes}}{0.75} = 3 \text{ Amp Fuse (at 25ºC)}$$

This charts shows typical ambient temperature effects on current carrying capacity of Littelfuse products. For specific re-rating information, please consult the product data sheet www.littelfuse.com or contact a Littelfuse representative.



Curve A: Thin-Film Fuses and 313 Series (.010 to .150A)

Curve B: FLAT-PAK®, TeleLink®, Nano²®, PICO®, Blade Terminal and other leaded and catridge fuses

Curve C: Resettable PTC's

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Fuse Selection Checklist (continued)

4. OVERLOAD CURRENT CONDITION: The current level for which protection is required. Fault conditions may be specified, either in terms of current or, in terms of both current and maximum time the fault can be tolerated before damage occurs. Time-current curves should be consulted to try to match the fuse characteristic to the circuit needs, while keeping in mind that the curves are based on average data.

5. MAXIMUM FAULT CURRENT: The Interrupting Rating of a fuse must meet or exceed the Maximum Fault Current of the circuit.

6. PULSES: The general term "pulses" is used in this context to describe the broad category of wave shapes referred to as "surge currents", "start-up currents", "inrush currents", and "transients". Electrical pulse conditions can vary considerably from one application to another. Different fuse constructions may not react the same to a given pulse condition. Electrical pulses produce thermal cycling and possible mechanical fatigue that could affect the life of the fuse. Initial or start-up pulses are normal for some applications and require the characteristic of a Slo-Blo® fuse. Slo-Blo® fuses incorporate a thermal delay design to enable them to survive normal start-up pulses and still provide protection against prolonged overloads. The start-up pulse should be defined and then compared to the time-current curve and I^2t rating for the fuse. Application testing is recommended to establish the ability of the fuse design to withstand the pulse conditions.

Nominal melting I^2t is a measure of the energy required to melt the fusing element and is expressed as "Ampere Squared Seconds" (A^2 Sec.). This nominal melting I^2t, and the energy it represents (within a time duration of 8 milliseconds [0.008 second] or less and 1 millisecond [0.001 second]or less for thin film fuses), is a value that is constant for each different fusing element. Because every fuse type and rating, as well as its corresponding part number, has a different fusing element, it is necessary to determine the I^2t for each. This I^2t value is a parameter of the fuse itself and is controlled by the element material and the configuration of the fuse element. In addition to selecting fuses on the basis of "Normal Operating Currents", "Re-rating", and "Ambient Temperature" as discussed earlier, it is also necessary to apply the I^2t design approach. This nominal melting I^2t is not only a constant value for each fuse element design, but it is also independent of temperature and voltage. Most often, the nominal melting I^2t method of fuse selection is applied to those applications in which the fuse must sustain large current pulses of a short duration. These high-energy currents are common in many applications and are critical to the design analysis.

The following example should assist in providing a better understanding of the application of I^2t.

EXAMPLE: Select a 125V, very fast-acting PICO®II fuse that is capable of withstanding 100,000 pulses of current (I) of the pulse waveform shown in Figure 1.

The normal operating current is 0.75 ampere at an ambient temperature of 25ºC.

Step 1 — Refer to Chart 1 and select the appropriate pulsewaveform, which is waveform (E) in this example. Place the applicable value for peak pulse current (i_p) and time (t) into the corresponding formula for waveshape (E), and calculate the result, as shown:

$$I^2t = \frac{1}{5}\ (i_P) = I^2t = \frac{1}{5}\ (i_P)\ ^2t$$

$$\frac{1}{5} \times 8^2 \times .004 = 0.0512\ A^2\ Sec.$$

This value is referred to as the "Pulse I^2t".

Step 2 — Determine the required value of Nominal Melting I^2t by referring to Chart 2. A figure of 22% is shown in Chart II for 100,000 occurrences of the Pulse I^2t calculated in Step 1. This Pulse I^2t is converted to its required value of Nominal Melting I^2t as follows:

Nom. Melt I^2t = Pulse I^2t/.22

0.0512/.22 = 0.2327 A^2 Sec.

Step 3 — Examine the I^2t rating data for the PICO® II, 125V, very fast-acting fuse. The part number 251001, 1 ampere design is rated at 0.256 A^2 Sec., which is the minimum fuse rating that will accommodate the 0.2327 A^2 Sec. value calculated in Step 2. This 1 ampere fuse will also accommodate the specified 0.75 ampere normal operating current, when a 25% derating factor is applied to the 1 ampere rating, as previously described.

7. PHYSICAL SIZE LIMITATIONS: Please refer to the product dimensions presented in current Littelfuse product data sheets for specific information.

8. AGENCY APPROVALS: For background information about common standards, please consult the STANDARDS section of this guide or visit our Design Support web site www.littelfuse.com/design-support.html. For specific agency approval information for each Littelfuse product, please refer to the data sheets within this catalog and information presented on www.littelfuse.com. As agency approvals and standards may change, please rely on the information presented on www.littelfuse.com as current information.

9. FUSE FEATURES: Please consult the specific product features presented within this catalog and on our web site www.littelfuse.com. For additional information and support contact your Littelfuse product representative.

10. FUSEHOLDER FEATURES AND RE-RATING: For information about the range of Littelfuse fuseholders and specific features and characteristics, please consult with a Littelfuse products representative or visit our web site www.littelfuse.com.

For 25ºC ambient temperatures, it is recommended that fuseholders be operated at no more than 60% of the nominal current rating established using the controlled test

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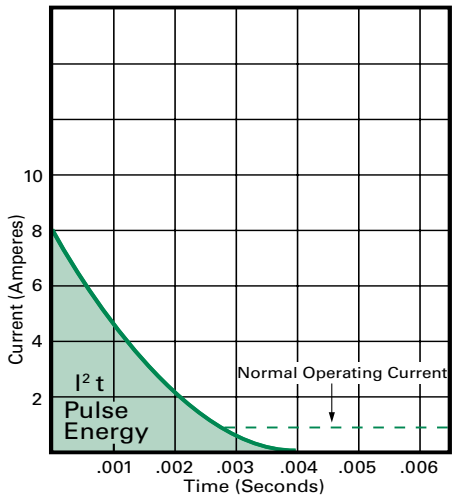
Fuse Selection Checklist (cont.)

FIGURE 1



conditions specified by Underwriters Laboratories. The primary objective of these UL test conditions is to specify common test standards necessary for the continued control of manufactured items intended for protection against fire, etc. A copper dummy fuse is inserted in the fuseholder by Underwriters Laboratories, and then the current is increased until a certain temperature rise occurs. The majority of the heat is produced by the contact resistance of the fuseholder clips. This value of current is considered to be the rated current of the fuseholder, expressed as 100% of rating. Some of the more common, everyday applications may differ from these UL test conditions as follows: fully enclosed fuseholders, high contact resistance,air movement, transient spikes, and changes in connecting cable size (diameter and length). Even small variations from the controlled test conditions can greatly affect the ratings of the fuse-holder. For this reason, it is recommended that fuseholders be derated by 40% (operated at no more than 60% of the nominal current rating established using the Underwriter Laboratories test conditions, as previously stated).

11. TESTING: The factors presented here should be considered in selecting a fuse for a given application. The next step is to verify the selection by requesting samples for testing in the actual circuit. Before evaluating the samples, make sure the fuse is properly mounted with good electrical connections, using adequately sized wires or traces. The testing should include life tests under normal conditions and overload tests Under fault conditions, to ensure that the fuse will operate properly in the circuit.

CHART 1

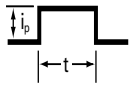
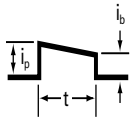
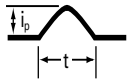
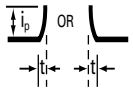
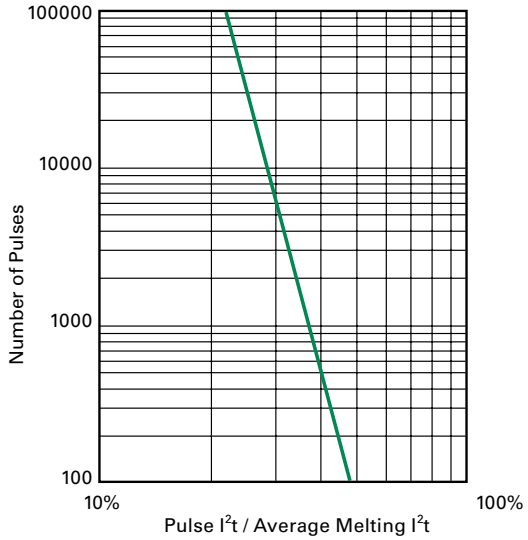
WAVESHAPES	FORMULAS
A 	$i = k$ $I^2t = i_p^2\ t$
B 	$i = i_p - kt$ $I^2t = (1/3)(i_p^2 + i_p i_b + i_b^2)\ t$
C 	$i = i_p \sin t$ $I^2t = (1/2)\ i_p^2\ t$
D	$I^2t = (1/3)\ i_p^2\ t$
E 	$i = kt^2$ OR $i = i_p(1-kt)^2$ $I^2t = (1/5)\ i_p^2\ t$
F	$i = i_p e^{-kt})$ $I^2t \cong (1/2)\ i_p^2\ t^1$

CHART 2

PULSE CYCLE WITHSTAND CAPABILITY	
100,000 Pulses	Pulse I^2t = 22% of Nominal Melting I^2t
10,000 Pulses	Pulse I^2t = 29% of Nominal Melting I^2t
1,000 Pulses	Pulse I^2t = 38% of Nominal Melting I^2t
100 Pulses	Pulse I^2t = 48% of Nominal Melting I^2t



Note: Adequate time (10 seconds) must exist between pulse events to allow heat from the previous event to dissipate.

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Standards

Fuse ratings and other performance criteria are evaluated under laboratory conditions and accptance criteria, as defined in one or more of the various fuse standards. It is important to understand these standards so that the fuse can be properly applied to circuit protection applications.

UL/CSA/ANCE (Mexico) 248-14 FUSES FOR SUPPLEMENTARY OVERCURRENT PROTECTION (600 Volts, Maximum) (Previously UL 198G and CSA C22.2, No. 59)

UL LISTED

A UL Listed fuse meets all the requirements of the UL/CSA/ANCE 248-14 Standard. Following are some of the requirements. UL ampere rating tests are conducted at 100%, 135%, and 200% of rated current. The fuse must carry 100% of its ampere rating and must stabilize at a temperature that does not exceed a 75ºC rise.

The fuse must open at 135% of rated current within one hour. It also must open at 200% of rated current within 2 minutes for 0-30 ampere ratings and 4 minutes for 35-60 ampere ratings.

The interrupting rating of a UL Listed fuse is 10,000 amperes AC minimum at 125 volts. Fuses rated at 250 volts may be listed as interrupting 10,000 amperes at 125 volts and, at least, the minimum values shown below at 250 volts.

Ampere Rating of Fuse	Interrupting Rating In Amperes	Voltage Rating
0 to 1	35	250 VAC
1.1 to 3.5	100	250 VAC
3.6 to 10	200	250 VAC
0.1 to 15	750	250 VAC
15.1 to 30	1500	250 VAC

Recognized Under the Component Program of Underwriters Laboratories

The Recognized Components Program of UL is different from UL Listing. UL will test a fuse to a specification requested by the manufacturer. The test points can be different from the UL Listed requirements if the fuse has been designed for a specific application. Application approval is required by UL for fuses recognized under the Component Program.

UL 275 AUTOMOTIVE GLASS TUBE FUSES (32 Volts)

UL LISTED

UL ampere ratings tests are conducted at 110%, 135%, and 200%. Interrupting rating tests are not required.

CSA Certification

CSA Certification in Canada is equivalent to UL Listing in the United States.

The Component Acceptance Program of CSA is equivalent to the Recognition Program at UL.

METI (Japan Ministry of Economy, Trade and Industry)

METI APPROVAL

METIⒶ approval in Japan is similar to UL Recognition in the United States.

METIⒷ has its own design standard and characteristics.

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

Publication 60127, Parts 1, 2, 3, 4, 6

The IEC organization is different from UL and CSA, since IEC only writes specifications and does not certify. UL and CSA write the specifications, and are responsible for testing and certification.

Certification to IEC specifications are given by such organizations as SEMKO (Swedish Institute of Testing and Approvals of Electrical Equipment), BSI (British Standards Institute) and VDE (German Standard Insitute), as well as UL and CSA.

IEC Publication 60127 defines three breaking capacity levels (interrupting rating). Low breaking capacity fuses must pass a test of 35 amperes or ten times rated current, whichever is greater, while enhanced breaking capacity fuses must pass a test of 150 amperes and high breaking capacity fuses must pass a test of 1500 amperes.

60127 Part 2

Sheet 1 — Type F Quick Acting, High Breaking Capacity

Sheet 2 — Type F Quick Acting, Low Breaking Capacity

Sheet 3 — Type T Time-Lag, Low Breaking Capacity

Sheet 4 — Style Fuses 1/4×1 1/4

Sheet 5 — Type T Time-Lag, High Breaking Capacity

Sheet 6 — Type T Time-Lag, Enhanced Breaking Capacity

The letters 'F' and 'T' represent the time-current characteristic of the fast-acting and time delay fuses. One of these letters will be marked on the end cap of the fuse.

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Standards (continued)

UL/CSA/ANCE (Mexico) 248-14 vs. IEC 60127 Part 2 FUSE OPENING TIMES vs. METI/MITI®

Percent of Rating	UL & CSA STD 248-14	IEC TYPE F Sheet 1 (*)	IEC TYPE F Sheet 2 (*)	IEC TYPE T Sheet 3 (*)	IEC TYPE T Sheet 5 (*)	METI/MITI ®
110	4Hr.Min.	—	—	—	—	
130	—	—	—	—	—	1Hr.Min.
135	60 Minutes Max.	—	—	—	—	
150	—	60 Minutes Min.	60 Minutes Min.	60 Minutes Min.	60 Minutes Min.	
160	—	—	—	—	—	1Hr.Max.
200	2 Minutes Max.	—	—	—	—	2 Minutes Max.
210	—	30 Minutes Max.	30 Minutes Max.	2 Minutes Max.	30 Minutes Max.	

(*) Note: The IEC Specification is written up to 10.0A. Any components above these ratings are not recognized by the IEC (although the fuses may have similar opening characteristics).

IEC also has opening time requirements at 275%, 400% and 1000%; however, the chart is used to show that fuses with the same ampere rating made to different specifications are not interchangeable. According to the IEC 60127 Standard, a one ampere-rated fuse can be operated at one ampere. A one ampere-rated fuse made to UL/CSA/ANCE 248-14 should not be operated at more than .75 ampere (25% derated — See RE-RATING section of FUSEOLOGY).

METI® does not differentiate between fast-acting and time delay characteristics.

Publication IEC 60127-4 (Universal Modular Fuse-Links [UMF])

This part of IEC 60127-4 covers both PCB through-hole and surface mount fuses. This standard covers fuses rated 32, 63, 125, and 250 volts. This standard will be accepted by UL/CSA making it the first global fuse standard. This specification uses different fusing gates than IEC 60127-2; the gates used here are 125%, 200%, and 1000%.

The fuses must not open in less than one hour at 125% of rated current and open within two minutes at 200% of rated current. The 1000% overload is used to determine the fuse characteristic. The opening time for each rating is listed below.

Type FF : Less than 0.001 sec.

Type F : From 0.001 - 0.01 sec.

Type T : From 0.01 - 0.1 sec.

Type TT : From 0.1 - 1.00 sec.

These characteristics correlate to the terminology used in IEC 60127-1.

Breaking capacity (interrupting rating) varies based on voltage rating. Parts rated at 32 & 63 volts must pass a test of 35 amperes or ten times rated current, whichever is greater. Parts rated at 125 volts must pass a test of 50 amperes or ten times rated current, whichever is greater. Parts rated at 250 volts are further defined as either low, intermediate or high breaking. The low breaking capacity fuses must pass a test of 100 amperes rated current, while intermediate breaking capacity fuses must pass a test of 500 amperes and high breaking capacity fuses must pass a test of 1500 amperes.

MILITARY/FEDERAL STANDARDS

MIL-PRF-15160 and MIL-PRF-23419

These specifications govern the construction and performance of fuses suitable primarily for military electronic applications.

MIL-PRF-19207

This specification governs the construction and performance of fuseholders suitable for military applications.

DSSC Drawing #87108

This drawing governs the construction and performance of .177" × .570" (2AG size) cartridge fuses and axial lead versions suitable for military applications. DSSC #87108 designation is included in the fuse end cap marking.

FEDERAL SPECIFICATION W-F-1814

This specification governs the construction and performance of fuses with high interrupting ratings that are approved for federal applications. Fuses approved to these specifications are on the Federal Qualified Products List.

Write to the following agencies for additional information on standards, approvals, or copies of the specifications.

Underwriters Laboratories Inc. (UL)
333 Pfingsten Road
Northbrook, Illinois, USA 60062-2096

Canadian Standards Association (CSA)
5060 Spectrum Way, Suite 100
Mississauga, Ontario, Canada L4W 5N6

International Electrotechnical Commission (IEC)
3, Rue de Varembe
1211 Geneva 20, Switzerland

Naval Publications and Military StandardsForm Center (for Military and Federal Standards)
5801 Tabor Avenue
Philadelphia, Pennsylvania, USA 19120

Defense Supply Center Columbus (DSCC)
3990 East Broad Street
Columbus, Ohio, USA 43218-3990

Ministry of Economy Trade and Industry (METI)
1-3-1 Kasumigaseki
Chiyouda-ku, Tokyo 100-8901, Japan

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Packaging and Part Numbering

Littelfuse Fuse Products Traditional Part Numbering System

0 X X X X X X X X X X X X X X X

Product Series Code
Example:
437 series fuse is "0437"

Ampere Rating Code
Decimal is to far right for whole number amp ratings, to far left for ratings less than one, and within center for fractional amp ratings.

Examples:
10A fuse is "010."
1/4A or 0.25A fuse is ".250"
1 1/2A or 1.5A fuse is "01.5"
1 1/4A or 1.25A fuse is "1.25"

Refer to the Electrical Characteristics tables presented in each product data sheet for specific amp rating codes

Packaging Quantity Code *

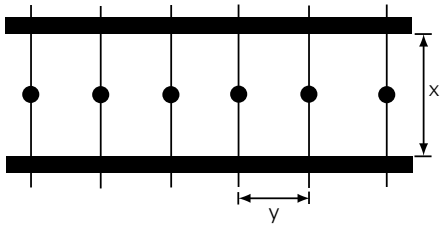
A/X	1	**H**	100	**D**	1500	**N**	5000
V	5	**F**	200	**P**	2000	**K**	10000
T	10	**G**	250	**E**	2500	**J**	12000
S	20	**U**	500	**W**	3000	**Z**	Misc.
L	50	**M**	1000	**Y**	4000		

Packaging Type *
A Ammo packed
B Bubble packed
C Chip packed
R Reeled
X Filler

Options Codes *
RT1 Reel and Tape, 2.062in (52.4mm) lead spacing
RT2 Reel and Tape, 2.50 in (63.5mm) lead spacing
RT3 Reel and Tape, 2.874 in (73mm) lead spacing
E Pigtail lead type fuse
ID Indicating fuse
L RoHS compliant
P Lead-free

* Not all options and codes listed here are available for all products.
For information about the specific options available for any Littelfuse product, please refer to the packaging details information within each product data sheet or contact your Littelfuse products representative.

Tape and Reel packaging per EIA-296:
Tape width is defined as the width of the tape and reeled fuse (x) as measured from inside tape to inside tape.
Pitch is defined as the space between two tape and reeled fuses (y) as measured from lead to lead.



Littelfuse Wickmann Products Part Numbering System

1.-3.	4.	5.-7.	8.	9.	10.	Stelle digit	Explanation
3xx	X	XXX	X	X	X		
			0	4	3		**Packaging**
TR3						**0**	Tape, Ammopack 1.000 pcs. TR5®
303							Tape, Ammopack
							Tape, Ammopack
TR5®							Tap, Rolle/ Reel
370						**1**	bulk, 1.000 pcs. TR5®
372						**2**	bulk, 300 pcs., TR3 short leads
382						**3**	bulk, 200 pcs., TR3 long leads / TR®
385						**4**	bulk 1.400 pcs., only TE5® / T²CP / MP / IP
391						**5**	tape in bulk 100 pcs., only Picofuse 275
950						**6**	bulk 2.500 pcs., only Picofuse 275
373						**Y**	customized
374							
							Variant
TE5®						**0**	Standard, long leads 18,8 mm
392						**1**	long leads 18,8 mm, TR3
395						**2**	
396						**4**	short leads 4,3 mm
						5	short leads 3,3 / 3,5 mm (special model)
T²CP							**Version**
397						**0**	Standard
						1	varying production
MP						**S**	PIP Surface Mount (TR5 blister tape 2x500 pcs.)
398							
							Rated Current Specification
IP							3-digit
399						**062**	= 62mA
						100	= 100mA / 1A / 10A
Pico						**125**	= 125A
275							
						0	< 1A
						1	≥ 1 - < 10A
						2	≥ 10 - < 100A
						3	≥ 100A

example 4.-7. digit
0062 = 62mA
0100 = 100mA
1100 = 1A
2100 = 10A
3125 = 125A

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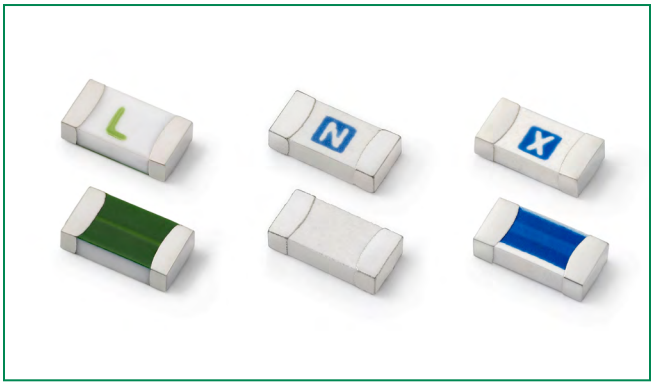
Littelfuse
Expertise Applied | Answers Delivered

437 Series – 1206 Fast-Acting 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).

The general design ensures excellent temperature stability and performance reliability.

In addition to this, the high I²t values typical of the Littelfuse Ceramic Fuse family ensure high inrush current withstand capability.

Features

- 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

Applications

- LCD Displays
- Servers
- Printers
- Scanners
- Data Modems

Additional Information

Datasheet | Resources | Samples

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
cULus	E10480	0.250A ~ 8A
CSA	29862	0.250A ~ 8A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time at 25°C
100%	250mA - 8A	4 hours, Minimum
250%	750mA - 8A	5 seconds, Maximum
350%	250mA -500mA	5 seconds, Maximum
350%	750mA - 8A	1 second, Maximum

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating[1]	Nominal Resistance (Ohms)[2]	Nominal Melting I²t (A²Sec.)[3]	Nominal Voltage Drop At Rated Current (V)[4]	Nominal Power Dissipation At Rated Current (W)	Agency Approvals	
								cULus	CSA
250mA	.250	125	50 A @ 125 V AC/DC	2.290	0.003	0.78	0.195	x	x
375mA	.375	125		1.330	0.010	0.60	0.225	x	x
500mA	.500	63	50 A @ 63 V AC/DC	0.908	0.018	0.52	0.260	x	x
750mA	.750	63		0.665	0.064	0.45	0.338	x	x
1A	001.	63		0.420	0.100	0.41	0.410	x	x
1.25A	1.25	63		0.318	0.1117	0.40	0.500	x	x
1.5A	01.5	63		0.209	0.1580	0.39	0.585	x	x
1.75A	1.75	63		0.071	0.2469	0.27	0.473	x	x
2A	002.	63		0.058	0.197	0.20	0.400	x	x
2.5A	02.5	32	50 A @ 32 V AC/35 V DC	0.043	0.457	0.15	0.375	x	x
3A	003.	32		0.033	0.506	0.14	0.420	x	x
3.5A	03.5	32		0.027	0.777	0.13	0.455	x	x
4A	004.	32		0.022	1.024	0.13	0.520	x	x
5A	005.	32		0.0159	2.30	0.13	0.650	x	x
7A	007.	32		0.0100	5.02	0.13	0.910	x	x
8A	008.	32		0.008	7.23	0.13	1.040	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. Contact Littelfuse if application transient surges are less than 1 ms.
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.

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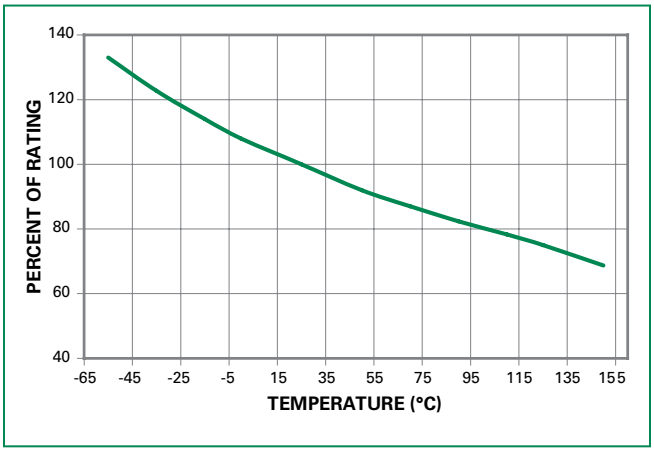
Surface Mount Fuses

Ceramic Fuse > 437 Series

Temperature Re-rating Curve



Note:

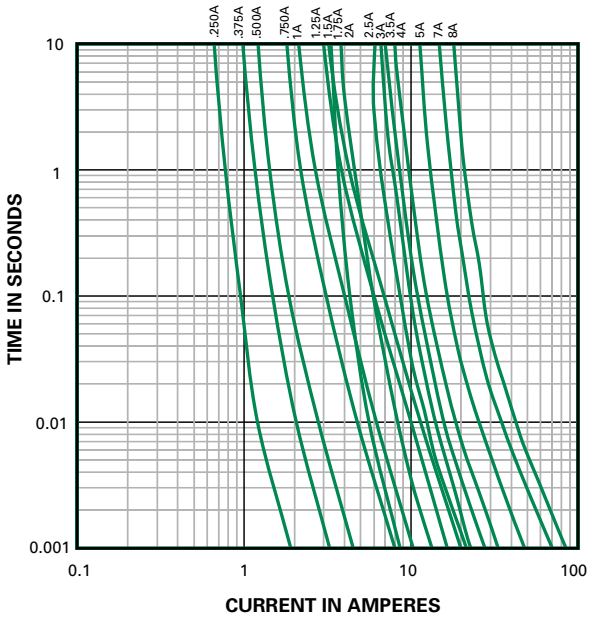
1. Re-rating depicted in this curve is in addition to the standard re-rating of 20% for continuous operation.

Example:

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

$I = (0.80)(0.85)I_{RAT} = (0.68)I_{RAT}$

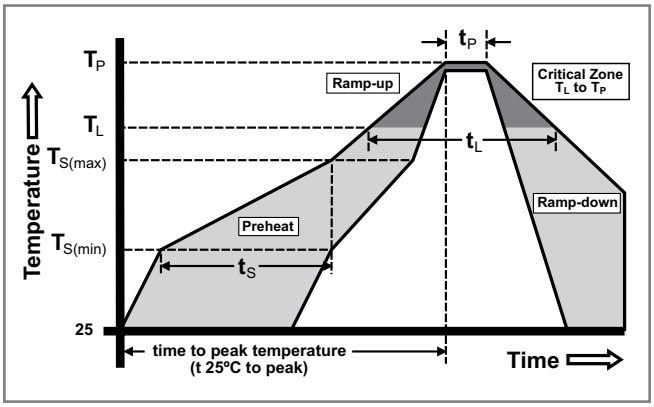
Average Time Current Curves



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 – 180 seconds
Average Ramp-up Rate (Liquidus Temp (T_L) to peak)		3°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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		10 – 30 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C

Wave Soldering	260°C, 10 seconds max.



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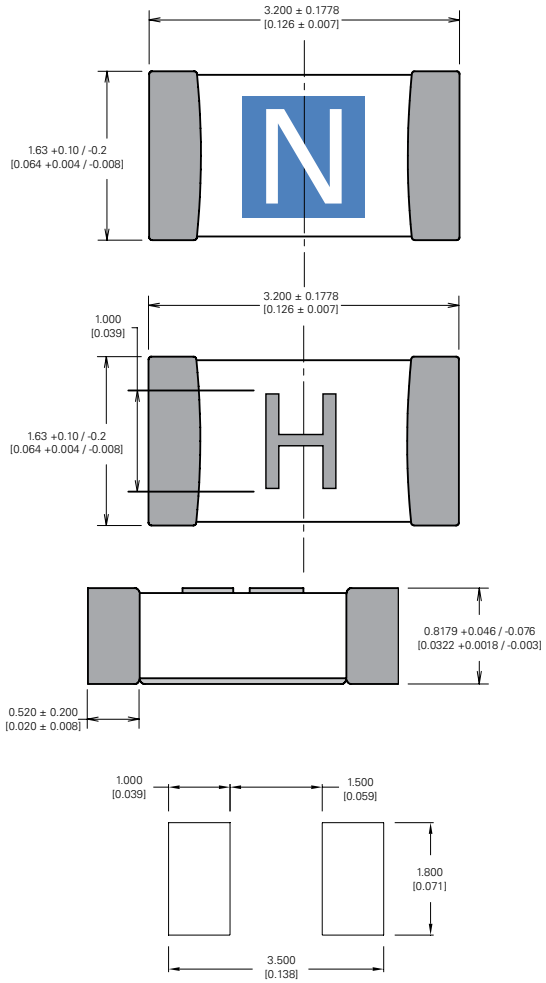
Product Characteristics

Materials	**Body:** Advanced Ceramic **Terminations:** Ag / Ni / Sn (100% Lead-free) **Element Cover Coating:** Ceramic/Lead-free Glass
Moisture Sensitivity Level	IPC/JEDEC J-STD-020, Level 1
Solderability	IPC/EIC/JEDEC J-STD-002, Condition B
Humidity Test	MIL-STD-202, Method 103, Condition D
Resistance to Solder Heat	MIL-STD-202, Method 210, Condition B
Moisture Resistance	MIL-STD-202, Method 106

Dimensions



Thermal Shock	MIL-STD-202, Method 107, Condition B
Mechanical Shock	MIL-STD-202, Method 213, Condition A
Vibration	MIL-STD-202, Method 201
Vibration, High Frequency	MIL-STD-202, Method 204, Condition D
Dissolution of Metallization	IPC/EIC/JEDEC J-STD-002, Condition D
Terminal Strength	IEC 60127-4

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**	007.	**W**
1.75	**L**	008.	**X**

Part Numbering System

0437 008. W R

- **SERIES** — 0437
- **AMP CODE** — 008.
- **QUANTITY CODE** — W = 3000 pcs
- **PACKING CODE** — R = Reel Pack

Packaging

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

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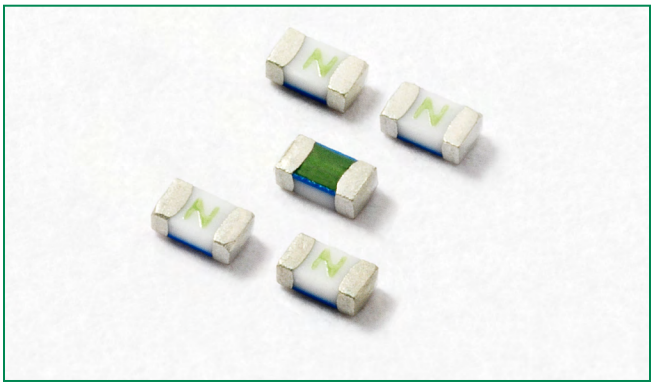
438 Series – 0603 Fast-Acting Fuse



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

- 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

Applications

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

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.250A – 6A
	29862	0.250A – 6A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time at 25°C
100%	0.250A – 6A	4 Hours, Minimum
250%	0.250A – 6A	5 Seconds, Maximum

Additional Information

Datasheet | Resources | Samples

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating	Nominal Resistance (Ohms)[2]	Nominal Melting I^2t (A^2Sec.)[3]	Nominal Voltage Drop At Rated Current (V)[4]	Nominal Power Dissipation At Rated Current (W)	Agency Approvals	
0.25	.250	63VDC	50A @ 63VDC 50A @ 32VAC	2.218	0.0017	0.550	0.138	x	x
0.375	.375	63VDC		1.247	0.0041	0.488	0.183	x	x
0.5	.500	63VDC		0.829	0.0100	0.486	0.243	x	x
0.75	.750	63VDC		0.466	0.0281	0.378	0.284	x	x
1	001.	63VDC		0.310	0.0593	0.351	0.351	x	x
1.25	1.25	63VDC		0.200	0.0510	0.365	0.456	x	x
1.5	01.5	63VDC		0.174	0.0902	0.368	0.552	x	x
1.75	1.75	63VDC		1.405	0.1440	0.360	0.540	x	x
2	002.	32	50A @ 32VDC/12VAC	0.051	0.1490	0.107	0.214	x	x
2.5	02.5	32		0.0324	0.1977	0.095	0.238	x	x
3	003.	32		0.0255	0.2922	0.093	0.279	x	x
3.5	03.5	32		0.0205	0.4752	0.082	0.287	x	x
4	004.	32		0.0170	0.6920	0.079	0.316	x	x
5	005.	32		0.0115	0.7398	0.074	0.370	x	x
6	006.	24	50A @ 24VDC/12VAC	0.0085	1.3838	0.072	0.432	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.

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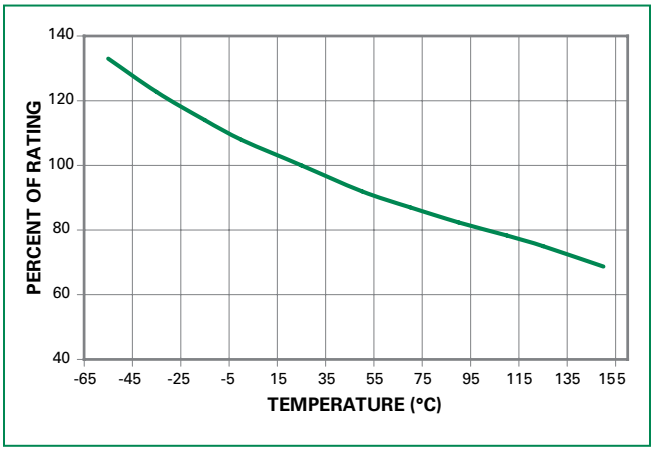
Temperature Re-rating Curve



Note:

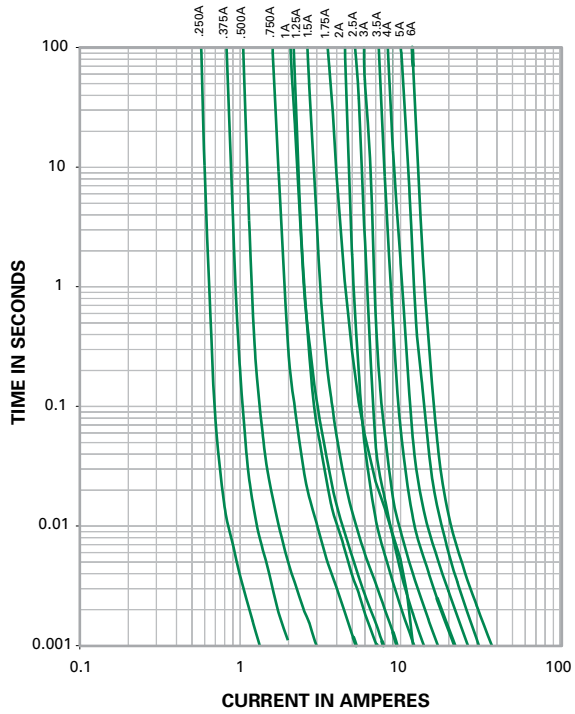
1. Re-rating depicted in this curve is in addition to the standard re-rating of 20% for continuous operation.

Example:

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

$I = (0.80)(0.85)I_{RAT} = (0.68)I_{RAT}$

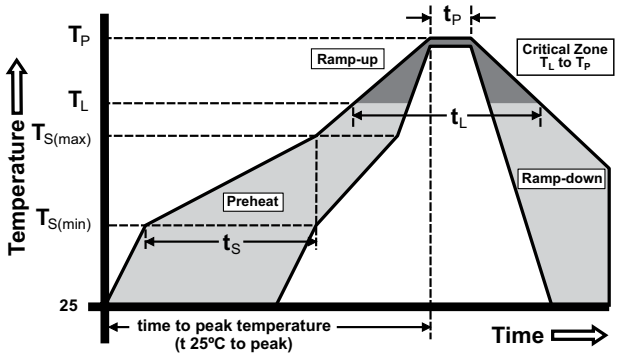
Average Time Current Curves



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 – 180 seconds
Average Ramp-up Rate (Liquidus Temp (T_L) to peak)		3°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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		10 – 30 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C

Wave Soldering	260°C, 10 seconds max.



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Surface Mount Fuses

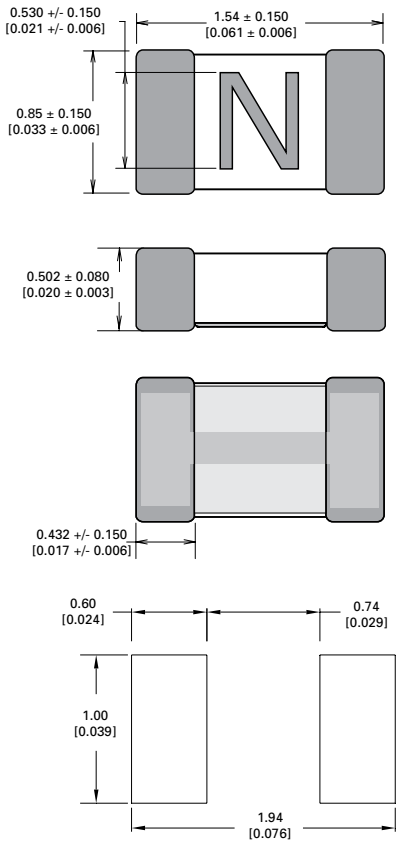
Ceramic Fuse > 438 Series

Product Characteristics

Materials	**Body:** Advanced Ceramic **Terminations:** Ag / Ni / Sn (100% Lead-free) **Element Cover Coating:** Lead-free Glass
Moisture Sensitivity Level	IPC/JEDEC J-STD-020, Level 1
Solderability	IPC/EIC/JEDEC J-STD-002, Condition B
Humidity	MIL-STD-202, Method 103, Conditions D
Resistance to Solder Heat	MIL-STD-202, Method 210, Condition B

Moisture Resistance	MIL-STD-202, Method 106
Thermal Shock	MIL-STD-202, Method 107, Condition B-3
Mechanical Shock	MIL-STD-202, Method 213, Condition A
Vibration	MIL-STD-202, Method 201
Vibration, High Frequency	MIL-STD-202, Method 204, Condition D
Dissolution of Metallization	IPC/EIC/JEDEC J-STD-002, Condition D
Terminal Strength	IEC 60127-4

Dimensions



Part Marking System

Amp Code	Marking Code
.250	**D**
.375	**E**
.500	**F**
.750	**G**
001.	**H**
1.25	**J**
01.5	**K**
1.75	**L**

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

Part Numbering System

0438 005. W R

SERIES

AMP CODE

PACKING CODE
R = Reel Pack

QUANTITY CODE
W = 3000 pcs

Packaging

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

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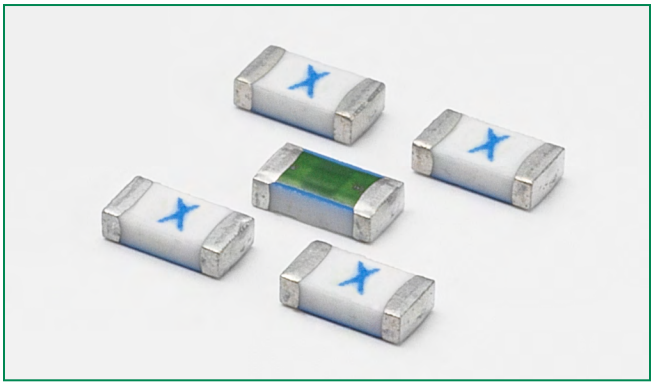
440 Series, 1206 High I²t Fuse



Description

The 440 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 temperatures up to 150°C and high inrush currents. The general design ensures excellent temperature stability and performance reliability. This high I²t fuse series is designed to have ultra high inrush current withstand capability to avoid nuisance fuse open.

Features

- 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
- Ultra high I²t values

Applications

- LCD Displays
- Servers
- Notebook Computers
- Printers
- Scanners
- Data Modems
- Hard Disk Drives

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	.25A - 8A
	29862	.25A - 8A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time at 25°C
100%	0.25A - 8A	4 hours, Minimum
350%	0.25A - 8A	5 secs., Maximum

Additional Information

Datasheet | Resources | Samples

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating (AC/DC)[1]	Nominal Resistance (Ohms)[2]	Nominal Melting I²t (A²Sec.)[3]	Nominal Voltage Drop At Rated Current (V)[4]	Nominal Power Dissipation At Rated Current (W)	Agency Approvals	
0.25	.250	125	50 A @ 125 V AC/DC	2.140	0.00649	0.5260	0.132	x	X
0.375	.375	125		1.216	0.01455	0.4993	0.187	x	X
0.5	.500	63	50 A @ 63 V AC/DC	0.8140	0.02642	0.4831	0.242	x	X
0.75	.750	63	50 A @ 63 V AC/DC	0.4624	0.09312	0.3983	0.299	x	X
1	001.	50	50 A @ 50 V DC 50 A @ 50 V AC	0.3096	0.21054	0.3457	0.346	x	X
1.25	1.25	50		0.2265	0.379	0.3240	0.405	x	X
1.5	01.5	50		0.1759	0.50652	0.3215	0.482	x	X
1.75	1.75	32	50 A @ 32 V AC/DC	0.0450	0.3312	0.0777	0.136	x	X
2	002.	32		0.0385	0.4326	0.0792	0.158	x	X
2.5	02.5	32		0.02850	0.8191	0.0747	0.187	x	X
3	003.	32		0.02252	1.232	0.0742	0.223	x	X
3.5	03.5	32		0.01845	1.789	0.0757	0.265	x	X
4	004.	32		0.01553	2.601	0.0709	0.284	x	X
5	005.	32		0.0120	4.761	0.0654	0.327	x	X
7	007.	32		0.00753	8.464	0.0696	0.487	x	X
8	008.	32		0.00634	12.95	0.0655	0.524	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. Contact Littelfuse if application transient surges are less than 1 ms.
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 Derating Curve" for additional derating information.
Devices designed to be mounted with marking code facing up.

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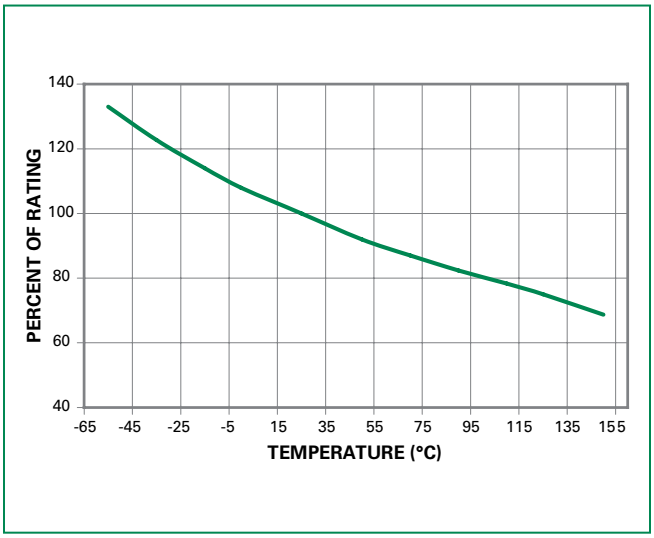
Surface Mount Fuses

Ceramic Fuse > 440 Series

Temperature Rerating Curve



Note:

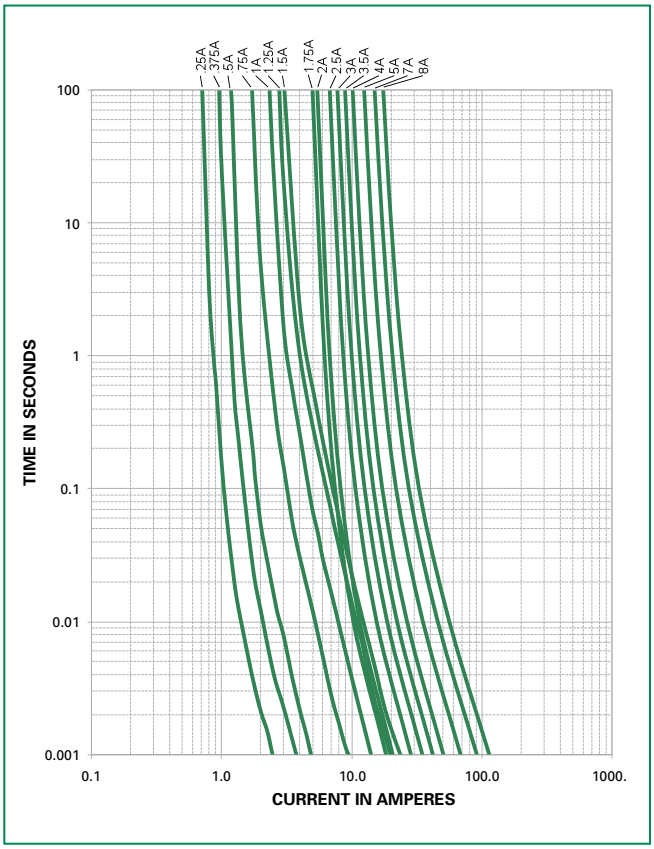
1. Rerating depicted in this curve is in addition to the standard derating of 20% for continuous operation.

Example:

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

$I = (0.80)(0.85)I_{RAT} = (0.68)I_{RAT}$

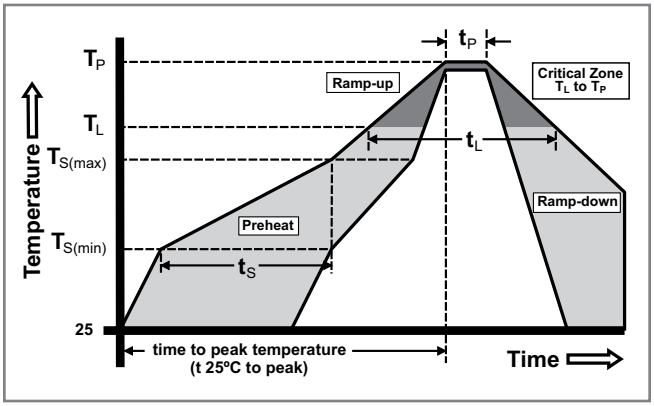
Average Time Current Curves



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 – 180 seconds
Average Ramp-Up Rate (Liquidus Temp (T_L) to peak)		3°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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		10 – 30 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C

Wave Soldering	260°C, 10 seconds max.



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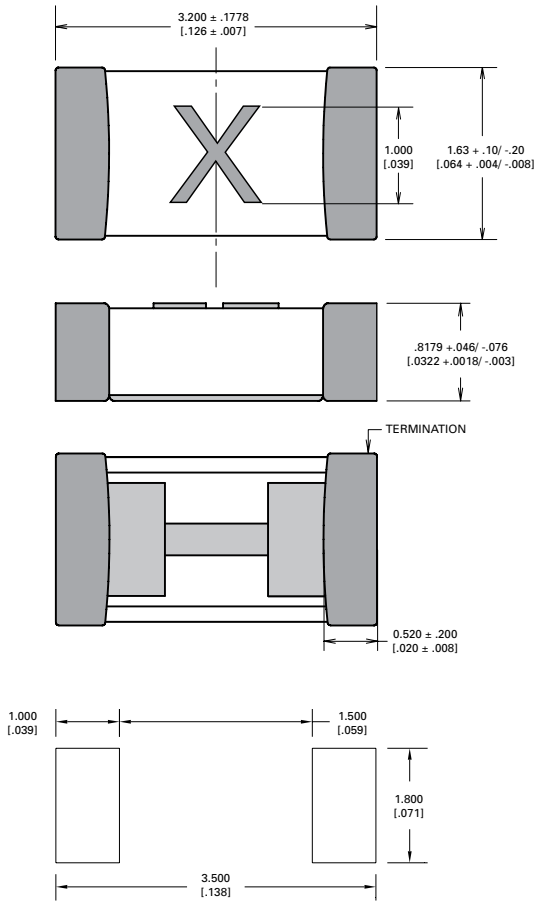
Product Characteristics

Materials	**Body:** Advanced Ceramic **Terminations:** Ag / Ni / Sn (100% Lead-free) **Element Cover Coating:** Lead-free Glass
Moisture Sensitivity Level	IPC/JEDEC J-STD-020, Level 1
Solderability	IPC/ECA/JEDEC J-STD-002, Condition C
Humidity Test	MIL-STD-202, Method 103, Conditions D
Resistance to Solder Heat	MIL-STD-202, Method 210, Condition B

Moisture Resistance	MIL-STD-202, Method 106
Thermal Shock	MIL-STD-202, Method 107, Condition B
Mechanical Shock	MIL-STD-202, Method 213, Condition A
Vibration	MIL-STD-202, Method 201
Vibration, High Frequency	MIL-STD-202, Method 204, Condition D
Dissolution of Metallization	IPC/ECA/JEDEC J-STD-002, Condition D
Terminal Strength	IEC 60127-4

Dimensions



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**	007.	**W**
1.75	**L**	008.	**X**

Part Numbering System

0440 008. W R

SERIES

AMP CODE

QUANTITY CODE
W = 3000 pcs

PACKING CODE
R = Reel Pack

Packaging

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

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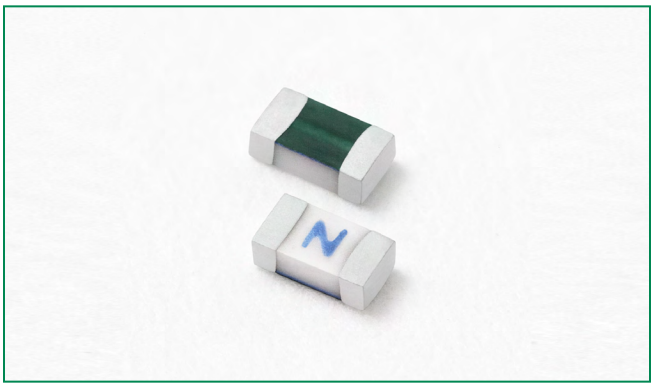
441 Series – 0603 High I²t Fuse



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 general design ensures excellent temperature stability and performance reliability.

This high I²t fuse series is designed to have ultra high inrush current withstand capability to avoid nuisance fuse open.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	2A - 6A
	29862	2A - 6A

Features

- 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 I²t values

Electrical Characteristics

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

Applications

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

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating	Nominal Resistance (Ohms)[2]	Nominal Melting I²t (A²Sec.)[3]	Nominal Voltage Drop At Rated Current (V)[4]	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	0.5520	0.0534	0.134	X	X
3	003.	32		0.0158	0.8165	0.0531	0.159	X	X
3.5	03.5	32		0.0117	0.9438	0.0468	0.164	X	X
4	004.	32		0.0097	1.2659	0.0475	0.190	X	X
5	005.	32		0.0073	1.6287	0.0472	0.236	X	X
6	006.	32		0.0056	2.6049	0.0464	0.278	X	X

Notes:

1. DC Interrupting Rating tested at rated voltage with time constant < 0.8 msecs.
2. Nominal Resistance measured with < 10% rated current.
3. Nominal Melting I²t measured at 1 msec. opening time.
4. 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.

Additional Information

Datasheet | Resources | Samples

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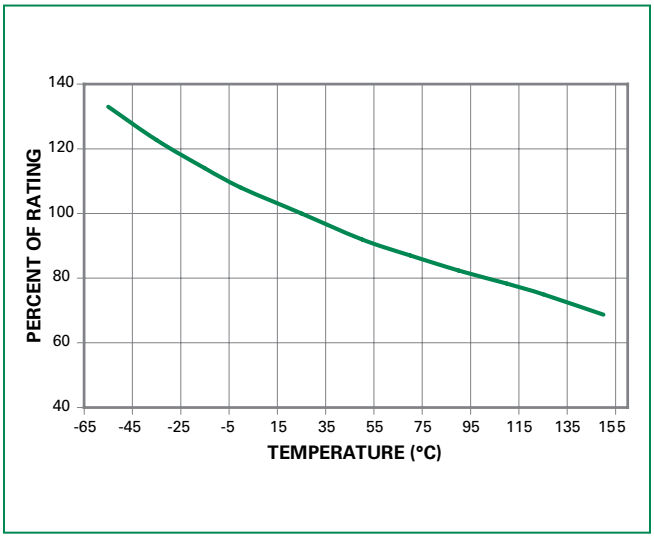
Temperature Re-rating Curve



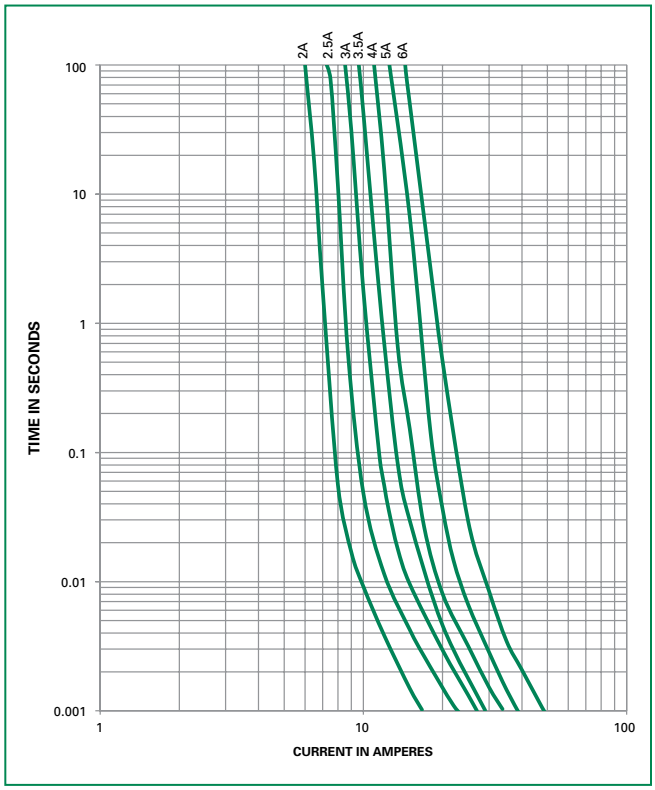
Note:

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:

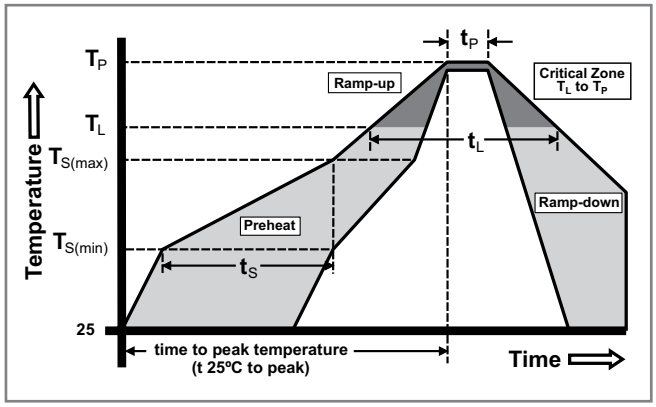
   $I = (0.80)(0.85)I_{RAT} = (0.68)I_{RAT}$

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 – 180 seconds
Average Ramp-up Rate (Liquidus Temp (T_L) to peak)		3°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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		10 – 30 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C



Wave Soldering	260°C, 10 seconds max.

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Surface Mount Fuses

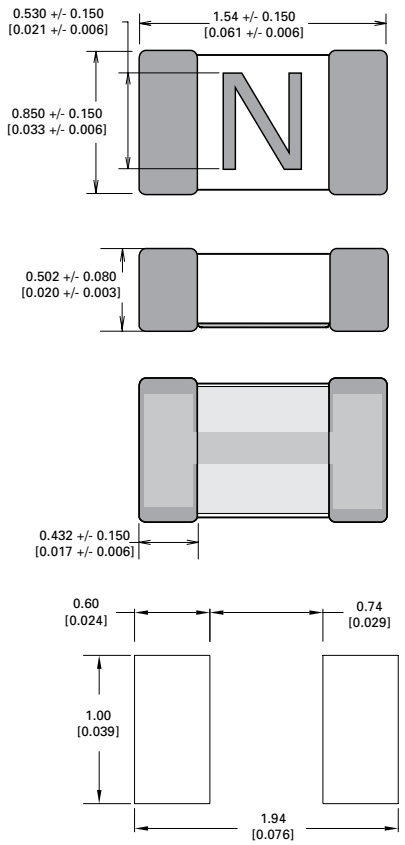
Ceramic Fuse > 441 Series

Product Characteristics

Materials	**Body:** Advanced Ceramic **Terminations:** Ag / Ni / Sn (100% Lead-free) **Element Cover Coating:** Lead-free Glass
Moisture Sensitivity Level	IPC/JEDEC J-STD-020, Level 1
Solderability	IPC/ECA/JEDEC J-STD-002, Condition C
Humidity	MIL-STD-202, Method 103, Conditions D
Resistance to Solder Heat	MIL-STD-202, Method 210, Condition B

Moisture Resistance	MIL-STD-202, Method 106
Thermal Shock	MIL-STD-202, Method 107, Condition B
Mechanical Shock	MIL-STD-202, Method 213, Condition A
Vibration	MIL-STD-202, Method 201
Vibration, High Frequency	MIL-STD-202, Method 204, Condition D
Dissolution of Metallization	IPC/ECA/JEDEC J-STD-002
Terminal Strength	IEC 60127-4

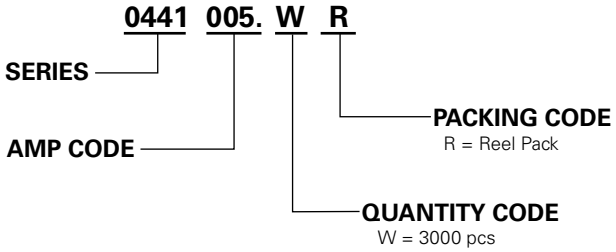
Dimensions



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, Part 3	3000	WR

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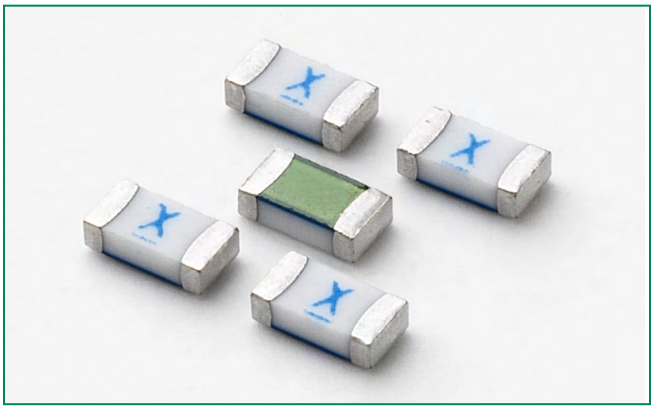
469 Series – 1206 Slo-Blo® Fuse



Description

The 469 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 I²t values, typical in the Littelfuse Ceramic fuse family, ensure high inrush current withstand capability.

Features

- 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

Applications

- LCD Displays
- Servers
- Notebook Computers
- Printers
- Scanners
- Data Modems
- Gaming Consoles

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	2A – 8A
	29862	2A – 8A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time at 25°C
100%	2A – 8A	4 hours, Minimum
200%	2A – 8A	1 sec., Min.; 120 secs., Max.
300%	2A – 8A	0.1 sec., Min.; 3 secs., Max.
800%	2A – 8A	0.002 sec., Min.; 0.05 sec., Max.

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating	Nominal Resistance (Ohms)[2]	Nominal Melting I²t (A²Sec.)[3]	Nominal Voltage Drop At Rated Current (V)[4]	Nominal Power Dissipation At Rated Current (W)	Agency Approvals	
2	002.	63	60 A @ 63 VDC	0.166	0.2250	0.455	0.91	x	x
4	004.	32	60 A @ 32 VDC	0.052	3.560	0.236	0.944	x	x
5	005.	32		0.033	5.620	0.216	1.080	x	x
6	006.	24	60 A @ 24 VDC	0.026	9.410	0.274	1.644	x	x
7	007.	24		0.020	14.400	0.216	1.512	x	x
8	008.	24		0.016	23.720	0.233	1.864	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 I²t 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.

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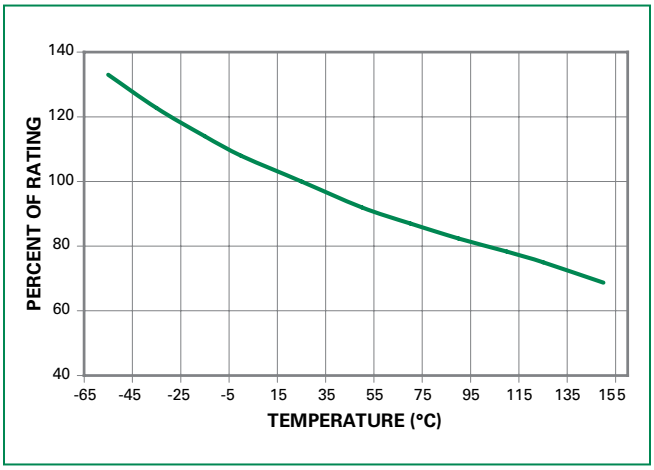
Surface Mount Fuses

Ceramic Fuse > 469 Series

Temperature Re-rating Curve



Note:

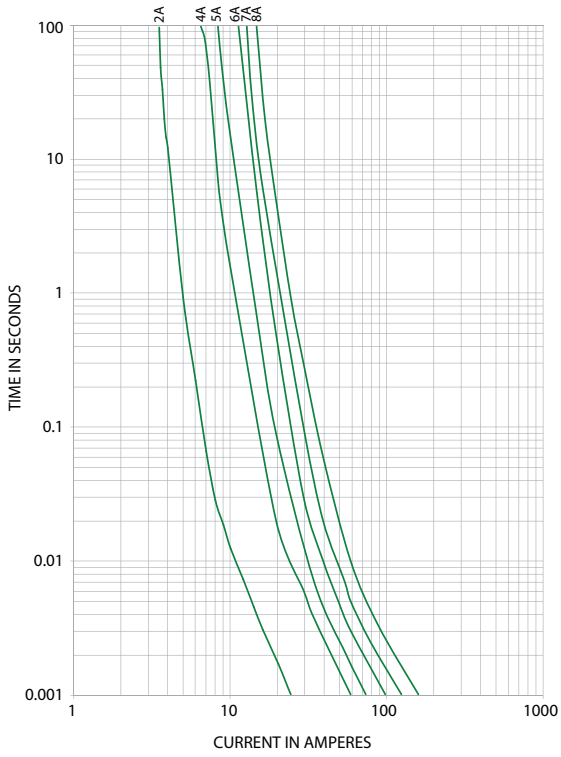
1. Re-rating depicted in this curve is in addition to the standard re-rating of 20% for continuous operation.

Example:

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

$I = (0.80)(0.85)I_{RAT} = (0.68)I_{RAT}$

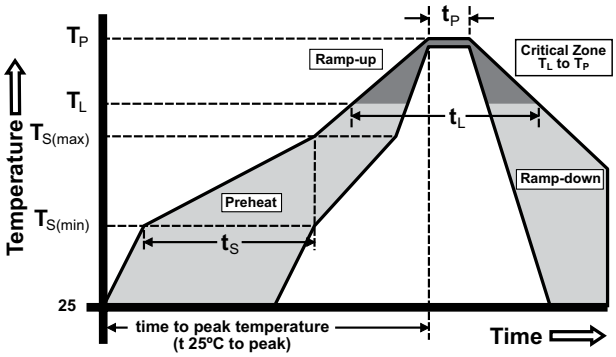
Average Time Current Curves



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 – 180 seconds
Average Ramp-up Rate (Liquidus Temp (T_L) to peak)		3°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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		10 – 30 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C

Wave Soldering	260°C, 10 seconds max.



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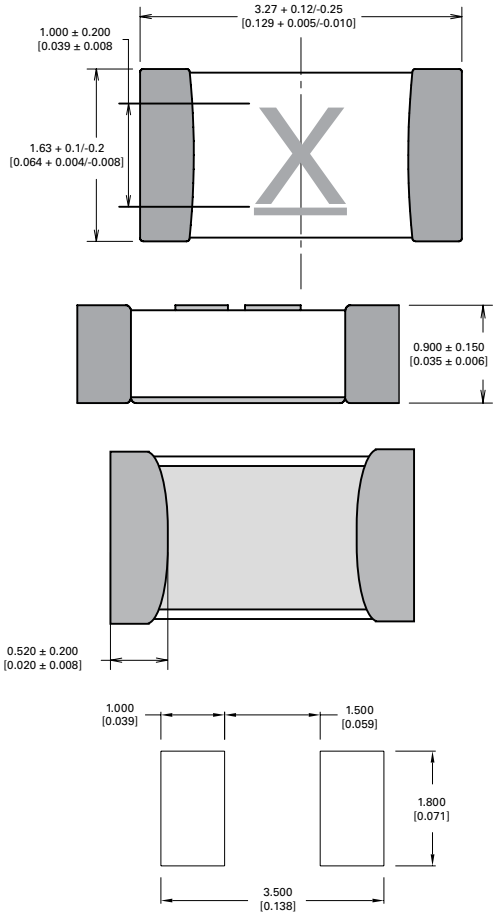
Product Characteristics

Materials	**Body:** Advanced Ceramic **Terminations:** Ag / Ni / Sn (100% Lead-free) **Element Cover Coating:** Lead-free Glass
Moisture Sensitivity Level	IPC/JEDEC J-STD-020, Level 1
Solderability	IPC/EIC/JEDEC J-STD-002, Condition B
Humidity	MIL-STD-202, Method 103, Conditions D
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition B

Moisture Resistance	MIL-STD-202, Method 106
Thermal Shock	MIL-STD-202, Method 107, Condition B
Mechanical Shock	MIL-STD-202, Method 213, Condition A
Vibration	MIL-STD-202, Method 201
Vibration, High Frequency	MIL-STD-202, Method 204, Condition D
Dissolution of Metallization	IPC/EIC/JEDEC J-STD-002, Condition D
Terminal Strength	IEC 60127-4

Dimensions



Part Marking System

Amp Code	Marking Code
002.	N
004.	S
005.	T
006.	U
007.	W
008.	X

Part Numbering System

0469 008. W R

- **SERIES**
- **AMP CODE**
- **QUANTITY CODE**
- **PACKING CODE**
  R = Reel Pack

Packaging

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

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Revised: 03/03/17

501 Series – High Current 1206 Fast-Acting Fuse

Description

The 501 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

- Operating Temperature from -55°C to +150°C
- Designed to provide over-current protection in high current voltage regulator module (VRM) applications
- 100% Lead-free, RoHS compliant and Halogen-free
- Suitable for both leaded and lead-free reflow / wave soldering

Applications

- Voltage Regulator Module (VRM) Equipment
- Notebook PC
- DC-DC Converter

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
c UL us	E10480	10A - 20A
CSA	29862	10A - 20A

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time at 25°C
100%	10A – 20A	4 Hours, Minimum
350%	10A – 20A	5 Seconds, Maximum

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max. Voltage Rating (V)	Interrupting Rating (DC)[1]	Nominal Resistance (Ohms)[2]	Nominal Melting I^2T ($A^2Sec.$)[3]	Nominal Voltage Drop At Rated Current (V)[4]	Nominal Power Dissipation At Rated Current (W)	Agency Approvals	
								c UL us	CSA
10	010.	32	150 A @ 32 VDC	0.00362	10.385	0.04407	0.4407	x	x
12	012.	32		0.00311	20.341	0.04927	0.5912	x	x
15	015.	32		0.00250	39.700	0.04843	0.7265	x	x
20	020.	32		0.00194	86.360	0.05888	1.1776	x	x

Notes:

1. DC Interrupting Rating tested at rated voltage with time constant < 0.5 msec.
2. Nominal Resistance measured with < 10% rated current.
3. Nominal Melting I^2t measured at 1 msec. opening time. For other I^2t data refer to chart.
4. Nominal Voltage Drop measured at rated current after temperature has stabilized and with fuse mounted on board with 3-oz Cu trace.

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.

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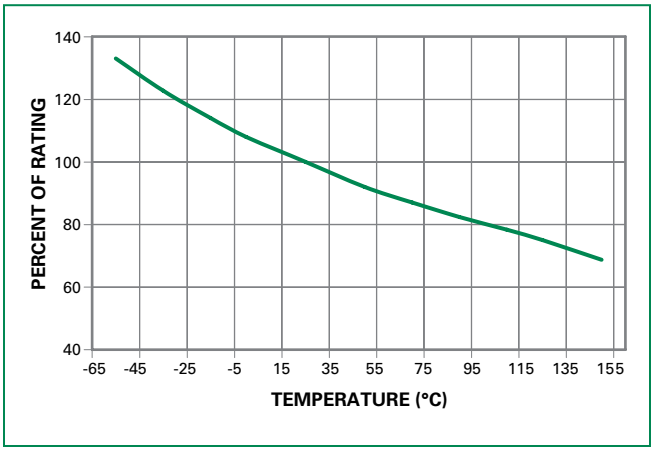
Temperature Re-rating Curve



Note:

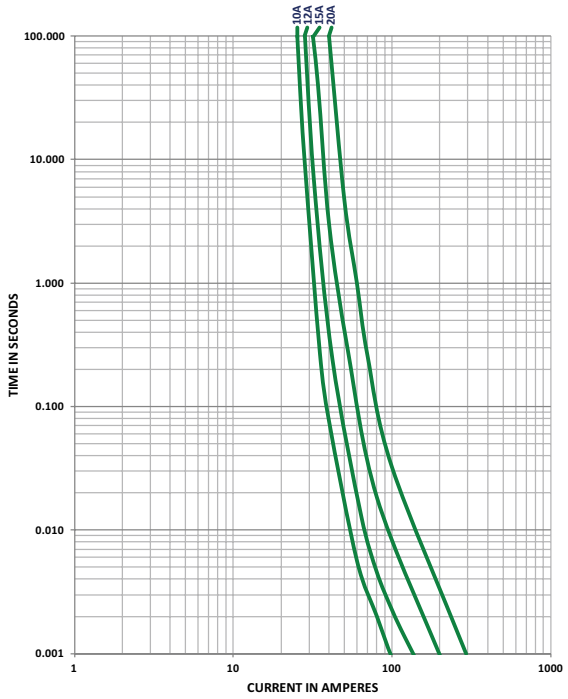
1. Re-rating depicted in this curve is in addition to the standard re-rating of 20% for continuous operation.

Example:

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

$I = (0.80)(0.85)I_{RAT} = (0.68)I_{RAT}$

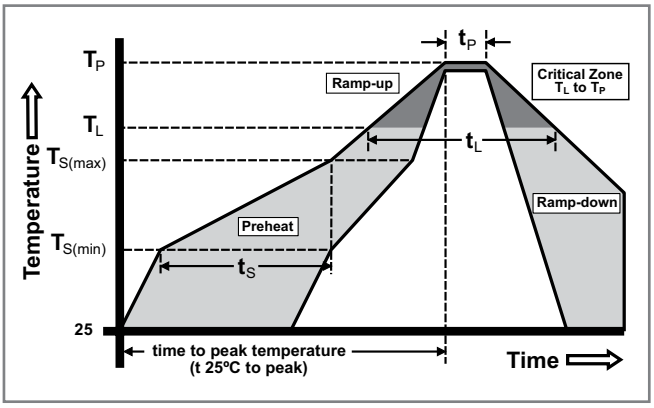
Average Time Current Curves



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 – 180 seconds
Average Ramp-up Rate (Liquidus Temp (T_L) to peak)		3°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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		10 – 30 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C

Wave Soldering	260°C, 10 seconds max.



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Surface Mount Fuses

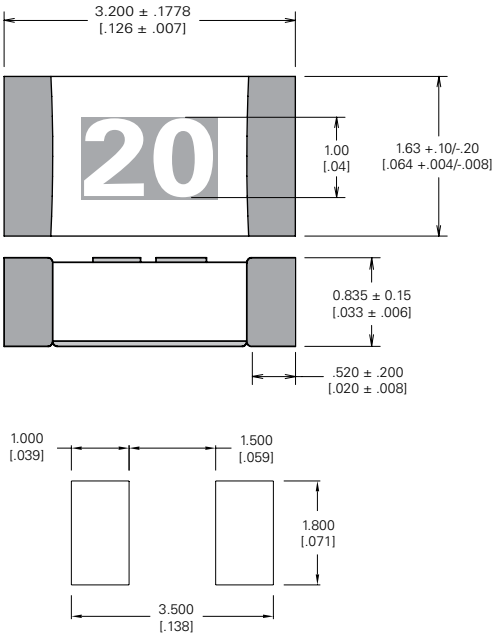
Ceramic Fuse > 501 Series

Product Characteristics

Materials	**Body:** Advanced Ceramic **Terminations:** Ag / Ni / Sn (100% Lead-free) **Element Cover Coating:** Lead-free Glass
Moisture Sensitivity Level	IPC/JEDEC J-STD-020, Level 1
Solderability	IPC/ECA/JEDEC J-STD-002, Condition B
Humidity Test	MIL-STD-202, Method 103, Conditions D
Resistance to Solvents	MIL-STD-202, Method 210, Condition B

Moisture Resistance	MIL-STD-202, Method 106
Thermal Shock	MIL-STD-202, Method 107, Condition B
Mechanical Shock	MIL-STD-202, Method 213, Condition A
Vibration	MIL-STD-202, Method 201
Vibration, High Frequency	MIL-STD-202, Method 204, Condition D
Dissolution of Metallization	IPC/ECA/JEDEC J-STD-002, Condition D
Terminal Strength	IEC 60127-4

Dimensions



Part Marking System

Amp Code	Marking Code
010.	10
012.	12
015.	15
020.	20

Part Numbering System

0501 020. W R

Series

AMP Code

Quantity
W = 3000 pcs

Packing Code
R = Reel Pack

Packaging

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

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466 Series 1206 Fast-Acting Fuse

Description

The 466 Series Fast-Acting Surface Mount Fuse (SMF) is a small (1206 size) thin-film device designed for secondary protection of circuits used in space constrained applications such as hand-held portable electronic devices.

This series is 100% lead-free and meets the requirements of the RoHS directive. New Halogen-Free 466 Series fuses are available to order using the "HF" suffix. See Part Numbering section for additional information.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.125A - 5A
	29862	0.125A - 5A

Features

- Product is compatible with lead-free solders and higher temperature profiles
- Product is marked on top surface with code to allow amperage rating identification without testing
- Low profile for height sensitive applications
- Flat top surface for pick-and-place operations
- Element-covering material is resistant to industry standard cleaning operations
- Lead-free, Halogen-free and RoHS compliant

Electrical Characteristics for Series

% of Ampere Rating	Opening Time at 25°C
100%	4 hours, Minimum
200%	5 sec., Maximum
300%	0.2 sec., Maximum

Additional Information

Datasheet | **Resources** | **Samples**

Applications

Secondary protection for space constrained applications:

- Cell phones
- Battery packs
- Digital cameras
- DVD players
- Hard disk drives

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Nom Voltage Drop (mV)	Nom Power Dissipation (W)	Agency Approvals	
0.125	.125	125	50A @125 V AC/DC	3.925	0.00064	634.37	0.0793	x	x
0.200	.200	125		1.100	0.00055	254.28	0.0509	x	x
0.250	.250	125		0.691	0.0022	207.01	0.0518	x	x
0.375	.375	125		0.351	0.0045	169.18	0.0634	x	x
0.500	.500	63	50A @63 V AC/DC	0.248	0.0060	158.47	0.0792	x	x
0.750	.750	63		0.106	0.0276	98.65	0.0740	x	x
1.00	001.	63		0.075	0.0423	79.97	0.0800	x	x
1.25	1.25	63		0.057	0.0640	85.71	0.1071	x	x
1.50	01.5	63		0.046	0.1103	82.97	0.1244	x	x
1.75	1.75	63		0.038	0.1835	80.73	0.1413	x	x
2.00	002.	63		0.030	0.2326	78.73	0.1575	x	x
2.50	02.5	32	50A @32 V AC/DC	0.023	0.3516	76.99	0.1925	x	x
3.00	003.	32		0.019	0.5760	75.99	0.2280	x	x
4.00	004.	32		0.014	1.764	74.50	0.2980	x	x
5.00	005.	32		0.011	2.500	73.75	0.3688	x	x

1. Measured at 10% of rated current, 25°C.
2. Measured at rated voltage.

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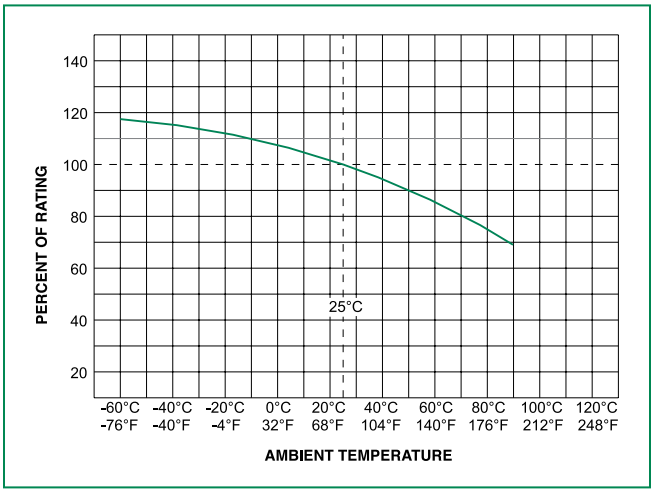
Surface Mount Fuses

Thin Film > 1206 Size > Very Fast-Acting > 466 Series

Temperature Re-rating Curve



Note:

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

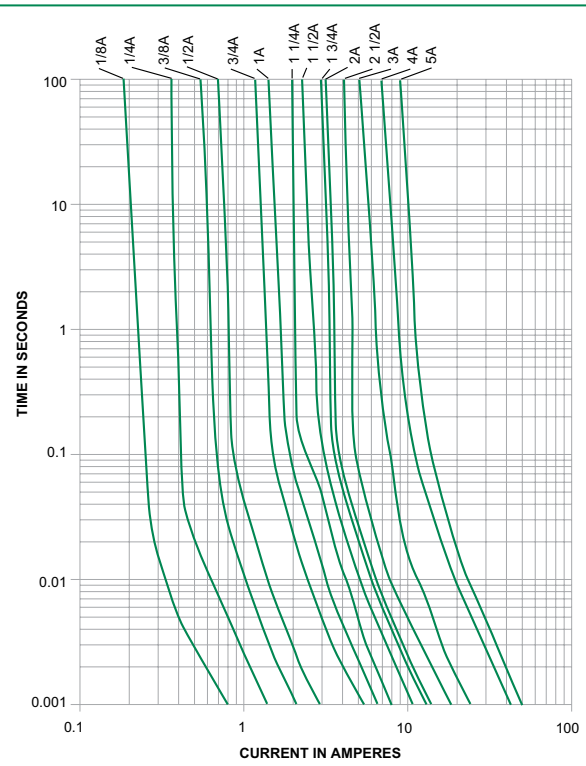
Example:

For continuous operation at 70 degrees celsius, the fuse should be rerated as follows:

$I = (0.75)(0.80)I_{RAT} = (0.60)I_{RAT}$

2. The temperature derating curve represents the nominal conditions. For questions about temperature derating curve, please consult Littelfuse technical support for assistance.

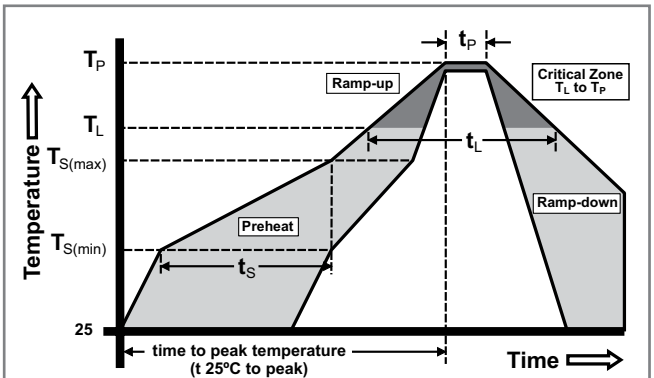
Average Time Current Curves



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 – 180 seconds
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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °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	260°C, 10 seconds max.



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Surface Mount Fuses

Thin Film > 1206 Size > Very Fast-Acting > 466 Series

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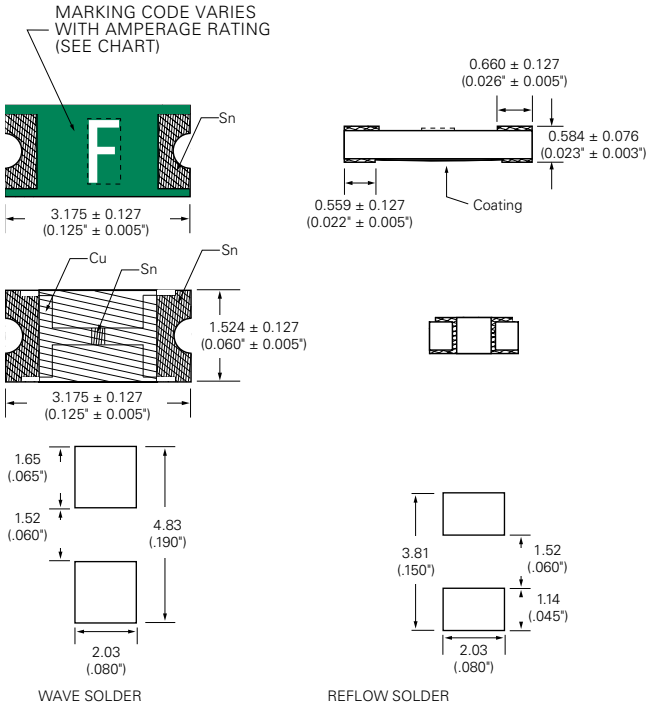
Product Characteristics

Materials	**Body:** Advanced High Temperature Substrate **Terminations:** 100% Tin over Nickel over Copper **Element Cover Coat:** Conformal Coating
Operating Temperature	– 55°C to 90°C. Consult temperature re-rating curve chart.
Thermal Shock	Withstands 5 cycles of –55°C to 125°C
Humidity	MIL-STD-202, Method 103, Condition D
Vibration	MIL-STD-202, Method 201
Insulation Resistance (After Opening)	Greater than 10,000 ohms
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition D

Part Marking System

Amp Code	Marking Code
.125	B
.200	C
.250	D
.375	E
.500	F
.750	G
001.	H
1.25	J
01.5	K
1.75	L
002.	N
02.5	O
003.	P
004.	S
005.	T

Dimensions



Part Numbering System

0466002.NRHF

SERIES

AMP Code
Refer to Amp Code column in the Electrical Specifications table. The dot is poisitioned before the Packaging Suffix with whole ratings and within the numbering sequence for fractional ratings.

N = 5000 pcs

PACKAGING Code
R = Tape and Reel

'HF' SUFFIX
HALOGEN FREE ITEM

.125 amp product is 0466.125NRHF (2 amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
8mm Tape and Reel	EIA-481 Rev. D (IEC 60286, part 3)	5000	NR

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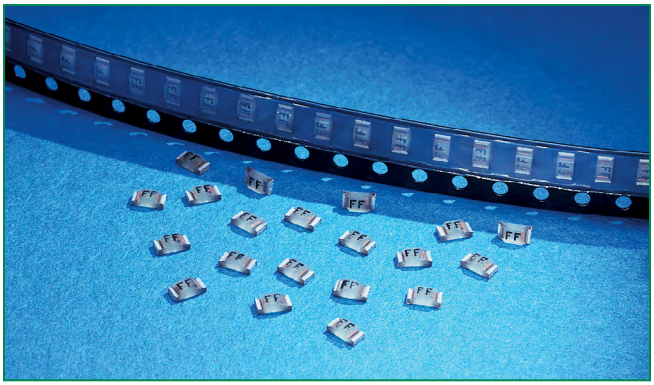
429 Series 1206 Fast-Acting Fuse



Description

The 429 Series Fast-Acting SMF is a small (1206 size) thin-film device designed for secondary protection of circuits used in space constrained applications such as hand-held portable electronic devices.

This series is Halogen-Free, Lead-Free and meets the requirements of the RoHS directive.

Features

- RoHS compliant and Lead-Free 7A device available-add 'L' suffix to part number.
- Halogen-Free 7A device available-add 'HF' suffix to the part number
- **For new designs up to 5A please consult the 433 or 466 Series**

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	7A
	29862	7A

Applications

Secondary protection for space constrained applications such as:

- Cell phones
- Battery packs
- Digital cameras
- DVD players
- Hard disk drives.

Electrical Characteristics for Series

% of Ampere Rating	Opening Time at 25°C
100%	4 hours, Minimum
200%	5 sec., Maximum
300%	0.2 sec., Maximum

Additional Information

Datasheet | Resources | Samples

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Agency Approvals	
7.00	007.	24	35A @24VAC/VDC	0.009	4.900	x	x

1. Measured at 10% of rated current, 25°C.
2. Measured at rated voltage.

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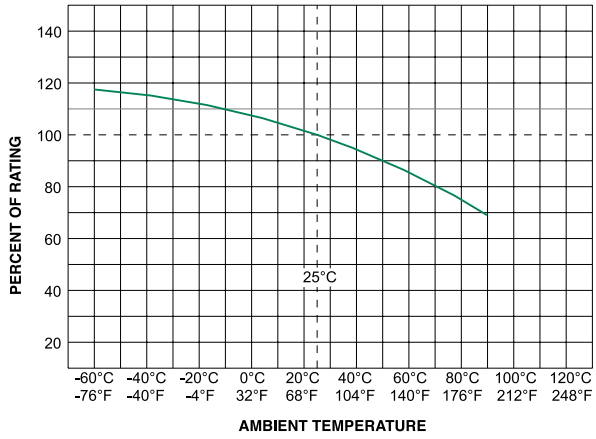
Revised: 03/03/17

Temperature Re-rating Curve



Note:

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

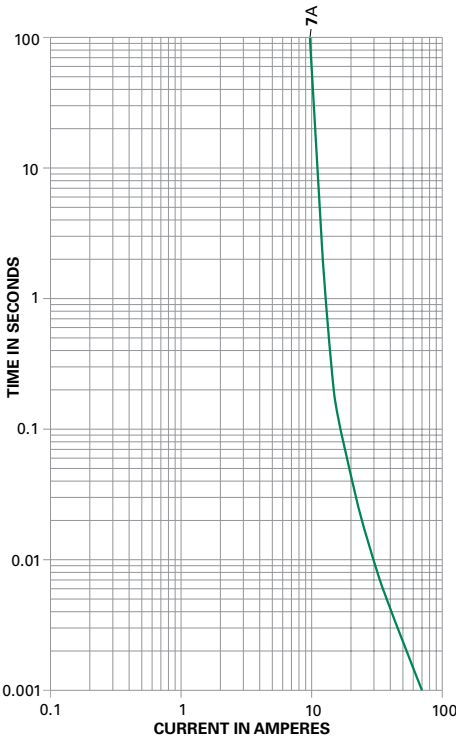
Example:

For continuous operation at 70 degrees celsius, the fuse should be deratedas follows:

$I = (0.75)(0.80)I_{RAT} = (0.60)I_{RAT}$

2. The temperature derating curve represents the nominal conditions. For questions about temperature derating curve, please consult Littelfuse technical support for assistance.

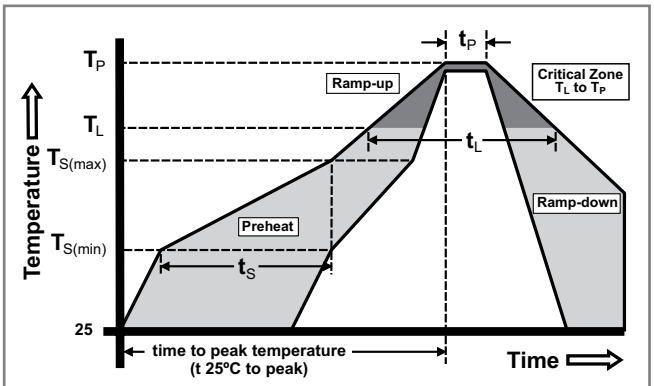
Average Time Current Curves



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 – 180 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 – 150 seconds
Peak Temperature (T_P)		$250^{+0/-5}$ °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	260°C, 10 seconds max.



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Surface Mount Fuses

Thin Film > 1206 Size > Very Fast-Acting > 429 Series

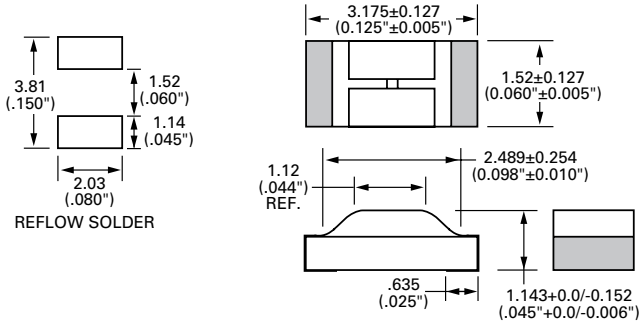
Product Characteristics

Materials	**Body:** Epoxy Substrate **Terminations, RoHS Compliant Device (429L):** 100% Tin over Nickel over Copper **Element Cover Coat:** Conformal Coating NOTE: Do not use alcohol-based cleaners or solvents with 429 Series Thin-Film Fuses as it may damage the coating.
Operating Temperature	– 55°C to 90°C. Consult temperature re-rating chart. For operation above 90°C contact Littelfuse.
Thermal Shock	Withstands 5 cycles of – 55°C to 125°C

Humidity	MIL-STD-202, Method 103 Condition D
Vibration	Withstands 10 – 55 Hz per MIL-STD-202, Method 201 and 10-2000 Hz at 20 g's per MIL-STD-202, Method 204, Condition D.
Insulation Resistance (After Opening)	Greater than 10,000 ohms
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition D

Dimensions

RECOMMENDED PAD LAYOUTS



Part Marking System

Series	Marking Code
429L	**7**

Part Numbering System

0429 007. WRM L HF

SERIES

AMP Code
Refer to Amp Code Column of Electrical characteristics table

QUANTITY Code
WRM = 3000 pieces, Tape and Reel

L = Lead-Free device and RoHS compliant device

'HF' SUFFIX
HALOGEN FREE ITEM

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Tape & Reel – 8mm tape	EIA-481 Rev. D (IEC 60286, part 3)	3000	WRM

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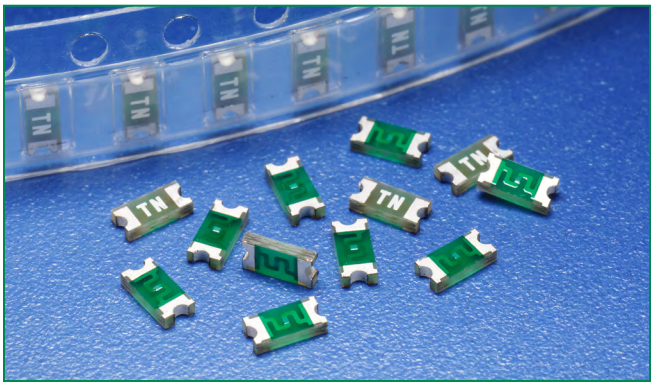
468 Series 1206 Slo-Blo® Fuse



Description

The 468 Series Slo-Blo® Surface Mount Fuse (SMF) is a small (1206 size) thin-film device designed for secondary protection of circuits used in space constrained applications such as hand-held portable electronic devices.

This series is 100% lead-free and meets the requirements of the RoHS directive. New Halogen-Free 468 Series fuses are available–to order use the "HF" suffix. See Part Numbering section for additional information.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.5A - 3A
	29862	0.5A - 3A

Features

- Complies with electronic industry environmental standards for lead reduction.
- Product is compatible with lead-free solders and higher temperature profiles.
- Time delay feature withstands high inrush currents and prevents nuisance openings.
- Package is visually distinct from fast-acting version for easy identification.
- Top side marking allows visual verification of amperage rating.

Electrical Characteristics for Series

% of Ampere Rating	Opening Time at 25°C
100%	4 hours, Minimum
200%	1 sec., Min.; 120 sec., Max.
300%	0.05 sec., Min.; 1.5 sec., Max
800%	0.0015 sec., Min.; .05 sec., Max.

Applications

Secondary protection for space constrained applications:

- Cell phones
- Battery packs
- Digital cameras
- DVD players
- Hard disk drives.

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Nom Voltage Drop (mV)	Nom Power Dissipation (W)	Agency Approvals	
0.50	.500	63	50A @63 VAC/VDC	0.27000	0.0310	156.77	0.0784	x	x
1.00	001.	63		0.0790	0.1270	94.70	0.0947	x	x
1.50	01.5	63		0.0440	0.2880	82.32	0.1235	x	x
2.00	002.	63	35A @63 VAC 50A @63 VDC	0.0325	0.5060	77.27	0.1545	x	x
2.50	02.5	63		0.0240	1.0110	73.92	0.1848	x	x
3.00	003.	32	50A @32 VAC/VDC	0.01950	1.2700	72.95	0.2189	x	x

1. Measured at 10% of rated current, 25°C.
2. Measured at rated voltage.

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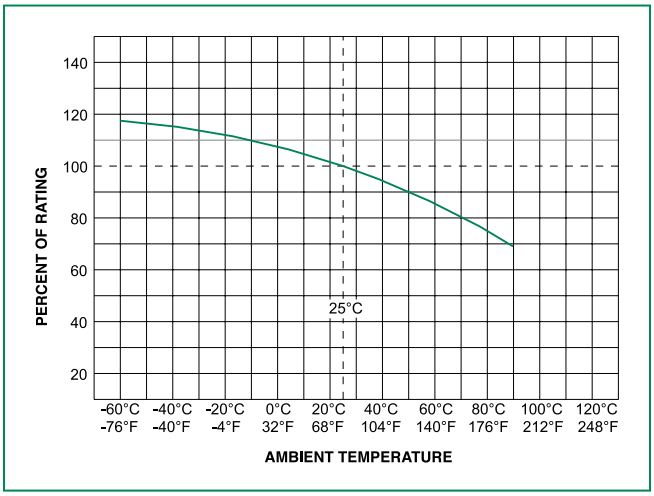
Surface Mount Fuses

Thin Film > 1206 Size > Slo-Blo® Fuse > 468 Series

Temperature Re-rating Curve



Note:

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

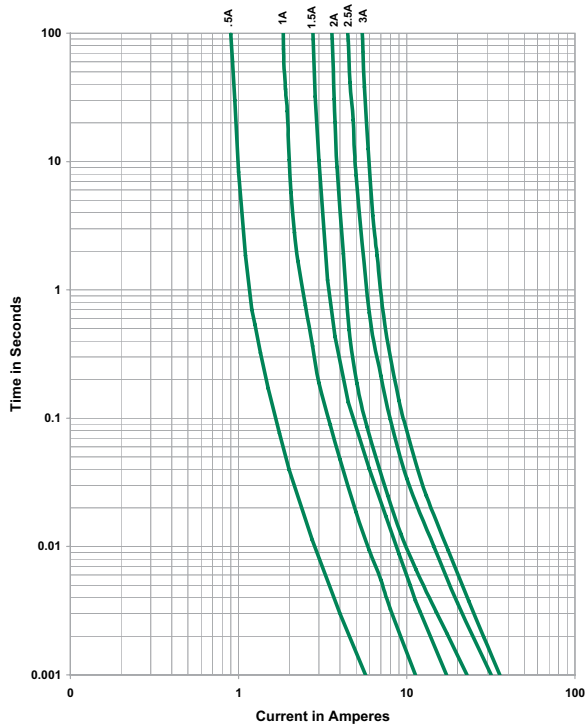
Example:

For continuous operation at 70 degrees celsius, the fuse should be deratedas follows:

$I = (0.75)(0.80)I_{RAT} = (0.60)I_{RAT}$

2. The temperature derating curve represents the nominal conditions. For questions about temperature derating curve, please consult Littelfuse technical support for assistance.

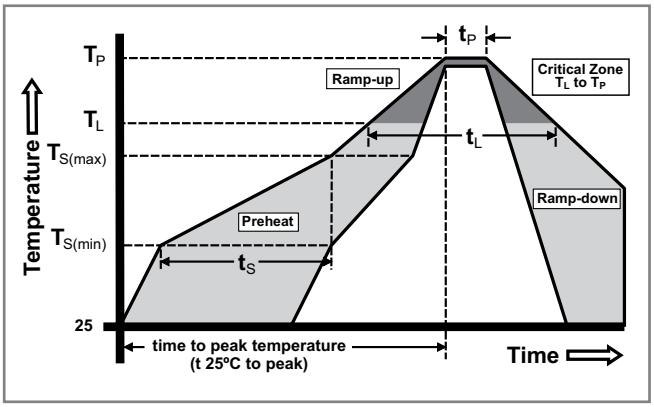
Average Time Current Curves



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 – 180 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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °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	260°C, 10 seconds max.



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Surface Mount Fuses

Thin Film > 1206 Size > Slo-Blo® Fuse > 468 Series

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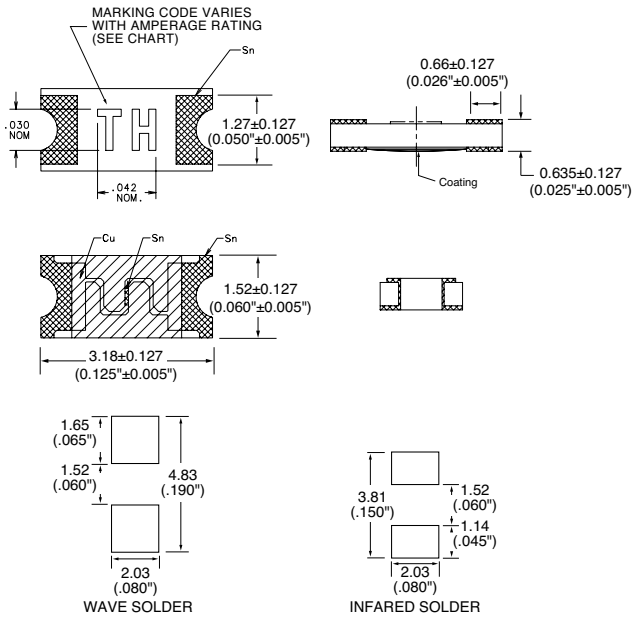
Product Characteristics

Materials	**Body:** Epoxy Substrate **Terminations:** 100% Tin over Nickel over Copper **Element Cover Coat:** Conformal Coating
Operating Temperature	–55°C to 90°C. Consult temperature re-rating curve chart. For operation above 90°C please contact Littelfuse
Thermal Shock	Withstands 5 cycles of – 50°C to 125°C
Humidity	MIL-STD-202, Method 103, Condition D

Vibration	Withstands 10-55 Hz per MIL-STD-202, Method 201 and 10-2000 Hz at 20 g's per MIL-STD-202, Method 204, Condition D
Insulation Resistance (After Opening)	Greater than 10,000 ohms.
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition D

Dimensions



Part Marking System

Amp Code	Marking Code
.500	**TF**
001.	**TH**
01.5	**TK**
002.	**TN**
02.5	**TO**
003.	**TP**

Part Numbering System

0468002.NRHF

SERIES

AMP Code
The dot is poisitioned before the Packaging Suffix with whole ratings and within the numbering sequence for fractional ratings. Refer to Amp Code column in the Electrical Specifications table.

PACKAGING Code
NR = Tape and Reel, 5000 pcs

'HF' SUFFIX
HALOGEN FREE ITEM

Example:
1.5 amp product is 0468**01.5**NRHF (2 amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Tape & Reel – 8mm tape	EIA-481 Rev. D (IEC 60286, part 3)	5000	NR

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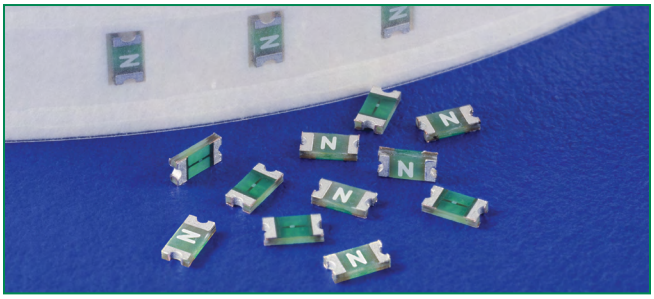
467 Series 0603 Fast-Acting Fuse



Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.250A - 5A
	29862	0.250A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time at 25°C
100%	4 hours, Minimum
200%	5 sec., Maximum
300%	0.2 sec., Maximum

Additional Information

Datasheet | **Resources** | **Samples**

Description

The 467 Series Fast-Acting Surface Mount Fuse (SMF) is an ultra small (0603 size) thin-film device designed for secondary protection of circuits used in space constrained applications such as hand-held portable electronic devices. This series is 100% lead-free and meets the requirements of the RoHS directive. New Halogen-Free 467 Series fuses are available–to order use the "HF" suffix. See Part Numbering section for additional information..

Features

- Compatible with lead-free solders and higher temperature profiles
- High performance materials provide improved performance in elevated ambient temperature applications
- Marked on top surface with code to allow amp rating identification without testing
- Low profile for height sensitive applications
- Flat top surface for pick-and-place operations
- Element covering material is resistant to industry standard cleaning operations
- Mounting pad and electrical performance is identical to Littelfuse 431 and 434 Series products
- Halogen free, Lead-free and RoHS compliant

Applications

Secondary protection for space constrained applications:

- Cell phones
- Battery packs
- Digital cameras
- DVD players
- Hard disk drives.

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Nom Voltage Drop (mV)	Nom Power Dissipation (W)	Agency Approvals	
0.250	.250	32	50A @32V AC/DC	0.5650	0.0014	158.56	0.0396	x	x
0.375	.375	32		0.3000	0.0035	128.03	0.0480	x	x
0.500	.500	32		0.1870	0.0087	138.50	0.0693	x	x
0.750	.750	32		0.1170	0.0171	123.30	0.0925	x	x
1.00	001.	32		0.0700	0.0212	67.40	0.0674	x	x
1.25	1.25	32	35A @32V AC/DC 13A @65V DC	0.0510	0.0518	84.32	0.1054	x	x
1.50	01.5	32		0.0385	0.0766	71.60	0.1074	x	x
1.75	1.75	32	35A @32V AC/DC	0.0310	0.0903	78.75	0.1378	x	x
2.00	002.	32		0.0280	0.1891	78.22	0.1564	x	x
2.50	02.5	32		0.0210	0.2066	76.10	0.1903	x	x
3.00	003.	32		0.0170	0.2403	75.04	0.2251	x	x
3.50	03.5	32		0.0139	0.4306	65.30	0.2286	x	x
4.00	004.	32		0.0118	0.8410	63.10	0.2524	x	x
5.00	005.	32		0.0089	0.9000	61.20	0.3060	x	x

1. Measured at 10% of rated current, 25°C. 2. Measured at rated voltage.

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Surface Mount Fuses

Thin Film > 0603 Size > Very Fast-Acting > 467 Series

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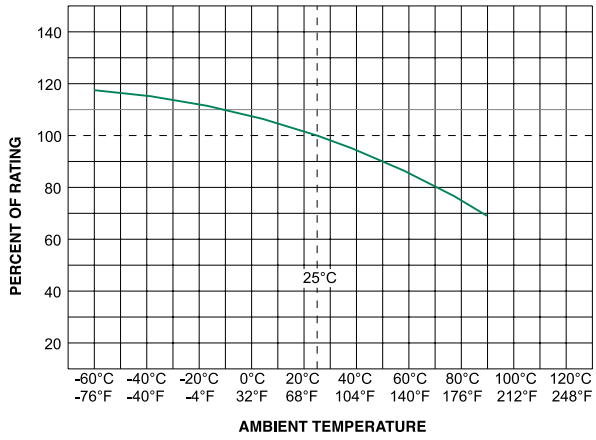
Temperature Rerating Curve



Note:

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

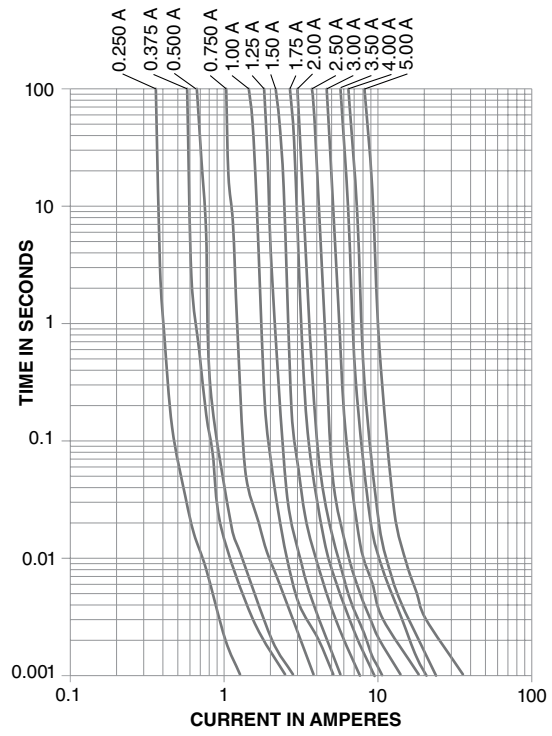
Example:

For continuous operation at 70 degrees celsius, the fuse should be deratedas follows:

$I = (0.75)(0.80)I_{RAT} = (0.60)I_{RAT}$

2. The temperature derating curve represents the nominal conditions. For questions about temperature derating curve, please consult Littelfuse technical support for assistance.

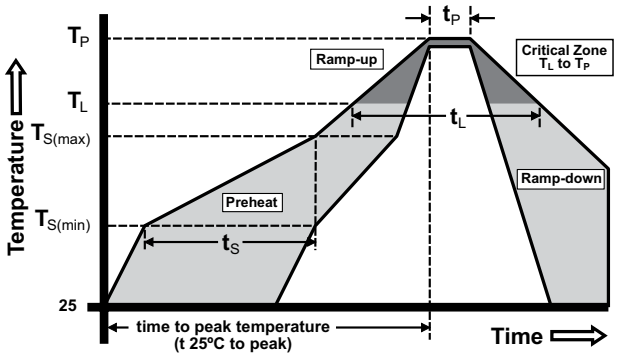
Average Time Current Curves



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 – 180 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 – 150 seconds
Peak Temperature (T_P)		$250^{+0/-5}$ °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	260°C, 10 seconds max.



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Surface Mount Fuses

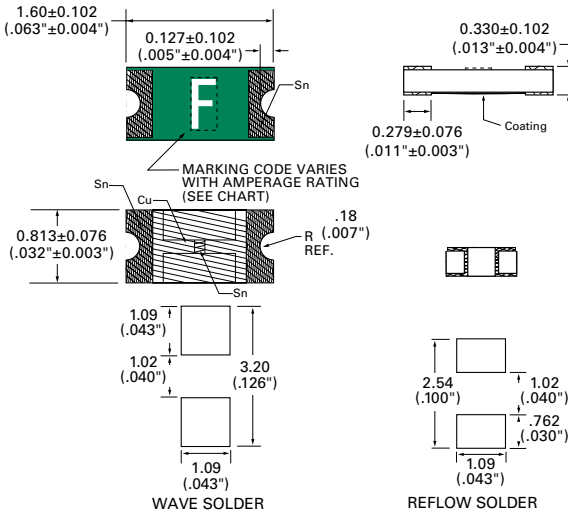
Thin Film > 0603 Size > Very Fast-Acting > 467 Series

Product Characteristics

Materials	**Body:** Advanced High Temperature Substrate **Terminations:** 100% Tin over Nickel over Copper **Element Cover Coat:** Conformal Coating
Operating Temperature	– 55°C to 90°C. Consult temperature re-rating curve chart. For operation above 90°C contact Littelfuse.
Humidity	MIL-STD-202, Method 103, Condition D

Thermal Shock	Withstands 5 cycles of – 55°C to 125°C
Vibration	Per MIL-STD-202
Insulation Resistance (After Opening)	Greater than 10,000 ohms.
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition D

Dimensions



Part Marking System

Amp Code	Marking Code
.250	D
.375	E
.500	F
.750	G
001.	H
1.25	J
01.5	K
1.75	L

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

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
8mm Tape and Reel	EIA-481 Rev. D (IEC 60286, part 3)	5000	NR

Part Numbering System

0467002.NRHF

SERIES

AMP Code
The dot is poisitioned before the Packaging Suffix with whole ratings and within the numbering sequence for fractional ratings. Refer to Amp Code column in the Electrical Specifications table.

PACKAGING Code
NR = Tape and Reel, 5000 pcs

'HF' SUFFIX
HALOGEN FREE ITEM

Example:
1.5 amp product is 0467**01.5**NRHF (2 amp product shown above).

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Surface Mount Fuses

Thin Film > 0603 Size > Fast-Acting > 494 Series

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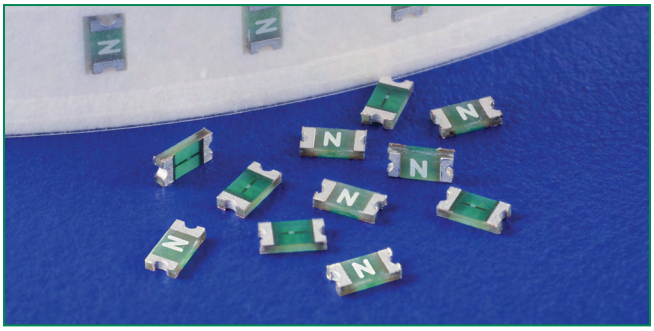
494 Series Fuse, NRA Special Series Integrated Circuit Protector



Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.25A - 5A
	29862	0.25A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time at 25°C
100%	4 hours, Minimum
200%	5 sec., Maximum
300%	0.2 sec., Maximum

Additional Information

Datasheet | **Resources** | **Samples**

Description

The 494 Series Fast-Acting SMF is an ultra small (0603 size) thin-film device designed for secondary protection of circuits used in space constrained applications such as hand-held portable electronic devices. This series is 100% lead-free and meets the requirements of the RoHS directive. New Halide-Free 494 Series fuses are available to order using the "HF" suffix. See Part Numbering section for additional information.

Features

- Compatible with lead-free solders and higher temperature profiles
- High performance materials provide improved performance in elevated ambient temperature applications
- Marked on top surface with code to allow ampere rating identification without testing
- Low profile for height sensitive applications
- Flat top surface for pick-and-place operations
- Element-covering material is resistant to industry standard cleaning operations
- Mounting pad and electrical performance are identical to Littelfuse 431 and 434 Series products
- Alloy-based element construction provides superior inrush withstand characteristics (I^2t) over ceramic or glass-based 0603 fuse products

Applications

Secondary protection for space constrained applications:

- Cell phones
- Battery packs
- Digital cameras
- DVD players
- Hard disk drives

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Nom Voltage Drop (mV)	Nom Power Dissipation (W)	Agency Approvals	
0.250	.250	32	50A @32V AC/DC	0.5900	0.0014	158.56	0.0396	x	x
0.375	.375	32		0.3100	0.0035	128.03	0.0480	x	x
0.500	.500	32		0.1895	0.0087	138.50	0.0693	x	x
0.750	.750	32		0.1185	0.0171	123.30	0.0925	x	x
1.00	001.	32		0.0780	0.0212	67.40	0.0674	x	x
1.25	1.25	32	35A @32V AC/DC	0.0615	0.0518	84.32	0.1054	x	x
1.40	01.4	32		0.0475	0.05529	74.84	0.1048	x	x
1.50	01.5	32		0.0405	0.0766	71.60	0.1074	x	x
1.75	1.75	32		0.0340	0.0903	78.75	0.1378	x	x
2.00	002.	32		0.0270	0.1891	78.22	0.1564	x	x
2.50	02.5	32		0.0220	0.2066	76.10	0.1903	x	x
3.00	003.	32		0.0185	0.2403	75.04	0.2251	x	x
3.15	3.15	32		0.0150	0.27405	63.78	0.2009	x	x
3.50	03.5	32		0.0105	0.4306	65.30	0.2286	x	x
4.00	004.	32		0.0130	0.8410	63.10	0.2524	x	x
5.00	005.	32		0.0090	0.9000	61.20	0.3060	x	x

1. Measured at 10% of rated current, 25°C. 2. Measured at rated voltage.

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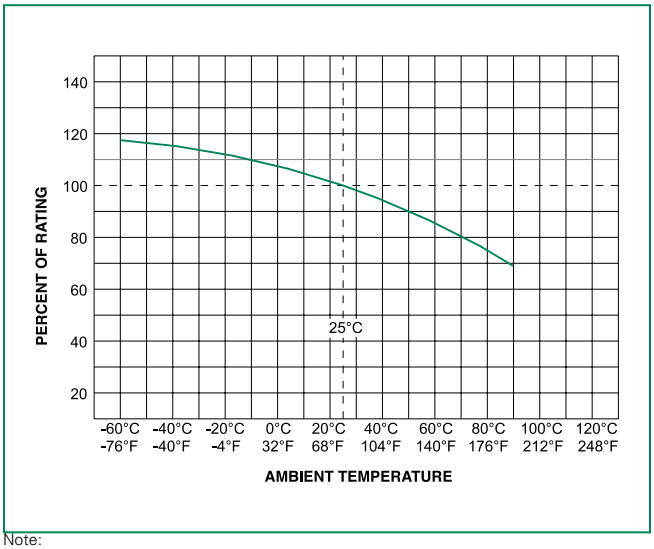
Surface Mount Fuses

Thin Film > 0603 Size > Fast-Acting > 494 Series

Temperature Re-rating Curve



Note:

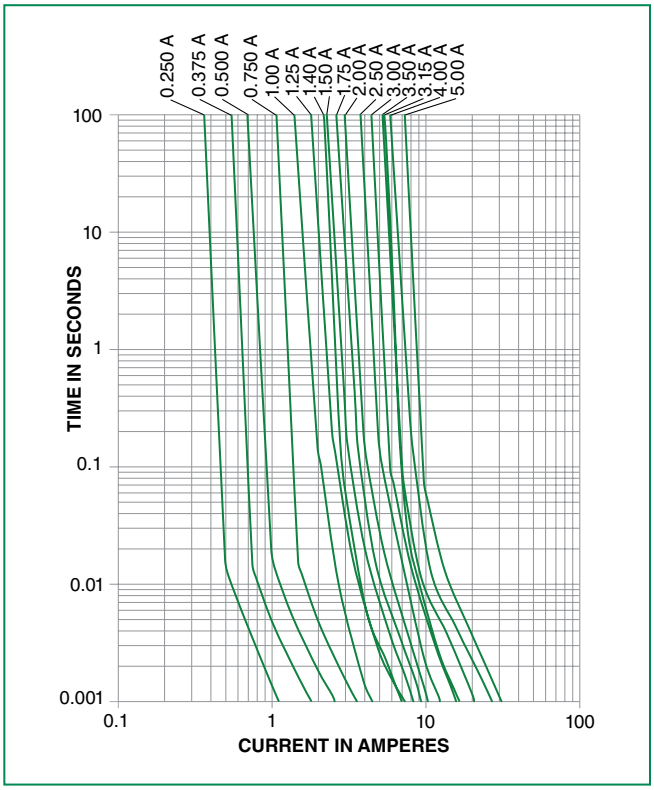
1. Rerating depicted in th1s curve 1s in addition to the standard rerating of 20% for continuous operation.

Example:

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

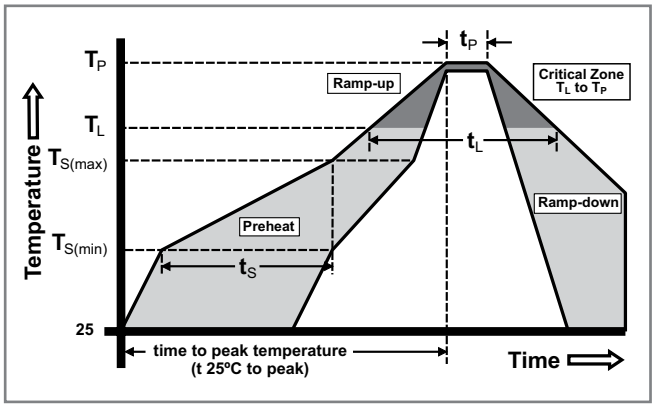
I = (0.80)(0.85)IRAT = (0.68)IRAT

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 – 180 seconds
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 – 150 seconds
Peak Temperature (T_P)		$250^{+0/-5}$ °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



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Surface Mount Fuses

Thin Film > 0603 Size > Fast-Acting > 494 Series

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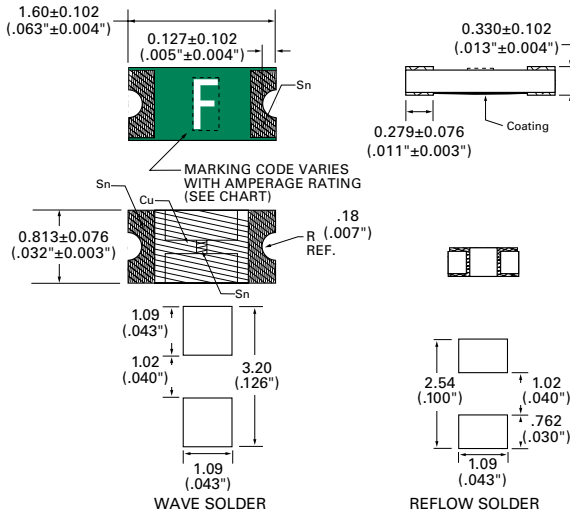
Product Characteristics

Materials	**Body:** Advanced High Temperature Substrate **Terminations:** 100% Tin over Nickel over Copper **Element Cover Coat:** Conformal Coating
Operating Temperature	– 55°C to 90°C. Consult temperature re-rating curve chart. For operation above 90°C contact Littelfuse.
Humidity	MIL-STD-202, Method 103, Condition D

Thermal Shock	Withstands 5 cycles of – 55°C to 125°C
Vibration	Per MIL-STD-202
Insulation Resistance (After Opening)	Greater than 10,000 ohms
Resistance to Soldering Heat	Withstands 60 seconds above 200°C and up to 260°C, maximum

Dimensions



Part Marking System

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

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
8mm Tape and Reel	EIA RS-481-2 (IEC 286, part 3)	5000	NR

Part Numbering System

0494002.NRHF

SERIES

AMP Code
Refer to Amp Code column in the Electrical Specifications table.
NOTE: The dot is poisitioned before the Packaging Suffix with whole ratings and within the numbering sequence for fractional ratings.

PACKAGING Code
NR = Tape and Reel, 5000 pcs

'HF' SUFFIX HALIDE FREE ITEM

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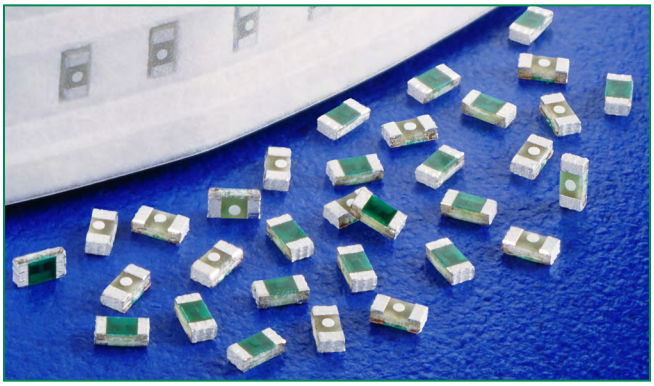
Surface Mount Fuses

Thin Film > 0402 Size > Very Fast-Acting > 435 Series

435 Series 0402 Fast-Acting Fuse



Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.250 - 5.0A
	29862	0.250 - 5.0A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time at 25°C
100%	0.250A - 5A	4 hours, Minimum
200%	0.375A - 5A	5 secs., Maximum
300%	0.250A	5 secs., Maximum
300%	0.375A - 5A	0.2 sec., Maximum

Description

The 435 Series are fast-acting surface mount thin-film fuses. Their ultra-small size (0402 size) makes them ideal for secondary protection of circuits used in space constrained applications such as hand-held portable electronic devices.

This series is 100% lead-free and meet the requirements of the RoHS directive. New Halogen-Free 435 Series fuses are available–to order use the "HF" suffix. See Part Numbering section for additional information.

Features

- 35A interrupt rating at 32VDC
- Small size with current ratings of 0.25 to 5.0 amperes
- RoHS compliant, Lead-Free and Halogen-Free
- Maximum protection of sensitive circuits as fuses are designed to open consistently in <5sec at 200% overload.
- Enhanced Breaking Capacity, High I^2t

Applications

Secondary protection for space constrained applications such as:

- Cell phones
- Battery packs
- Digital cameras
- DVD players
- Hard disk drives.

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Nom Voltage Drop (mV)	Nom Power Dissipation (W)	Agency Approvals	
0.250	.250	32	35A @32VDC[2]	0.3600[1]	0.0025	92.49	0.0231	x	x
0.375	.375	32		0.1930[1]	0.0035	84.64	0.03174	x	x
0.500	.500	32		0.1600[1]	0.0053	93.35	0.04668	x	x
0.750	.750	32		0.1050[1]	0.0120	101.84	0.07638	x	x
1.00	001.	32		0.0730[1]	0.0200	87.45	0.08745	x	x
1.25	1.25	32		0.0600[1]	0.0350	96.37	0.12046	x	x
1.50	01.5	32		0.0470[1]	0.0560	86.70	0.13005	x	x
1.75	1.75	32		0.0390[1]	0.0750	81.13	0.14198	x	x
2.00	002.	32		0.0300[1]	0.1000	70.62	0.14120	x	x
2.50	02.5	32		0.0200[1]	0.1560	55.25	0.13813	x	x
3.00	003.	32		0.0170[1]	0.2032	60.58	0.18740	x	x
3.50	03.5	32		0.0150[1]	0.3017	57.84	0.20244	x	x
4.00	004.	32		0.0105[1]	0.3084	57.00	0.22800	x	x
5.00	005.	32		0.0085[1]	0.5310	52.44	0.26220	x	x

1. Measured at 10% of rated current, 25°C.
2. Measured at rated voltage.

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Surface Mount Fuses

Thin Film > 0402 Size > Very Fast-Acting > 435 Series

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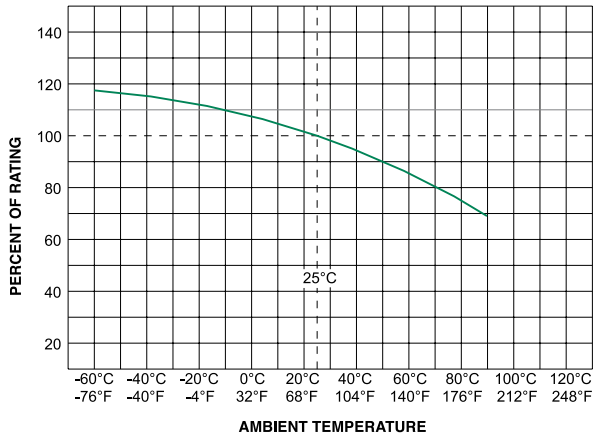
Temperature Re-rating Curve



Note:

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

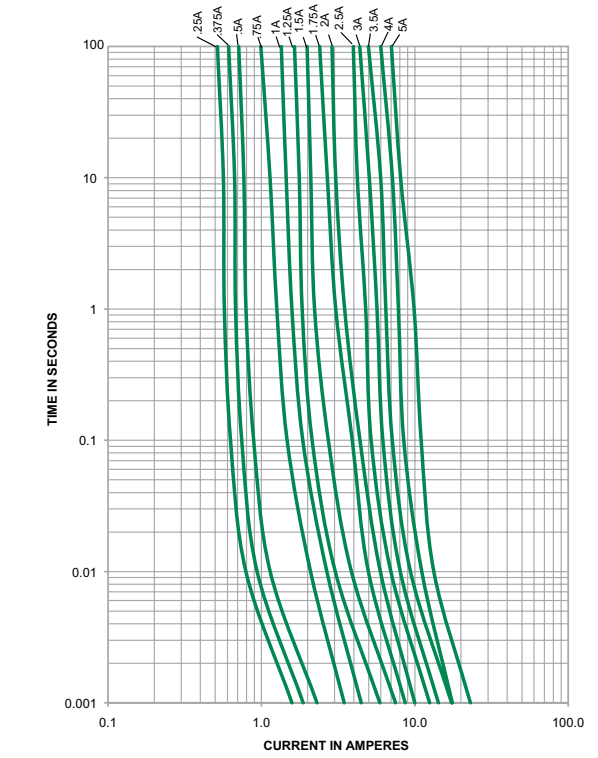
Example:

For continuous operation at 70 degrees celsius, the fuse should be deratedas follows:

$I = (0.75)(0.80)I_{RAT} = (0.60)I_{RAT}$

2. The temperature derating curve represents the nominal conditions. For questions about temperature derating curve, please consult Littelfuse technical support for assistance.

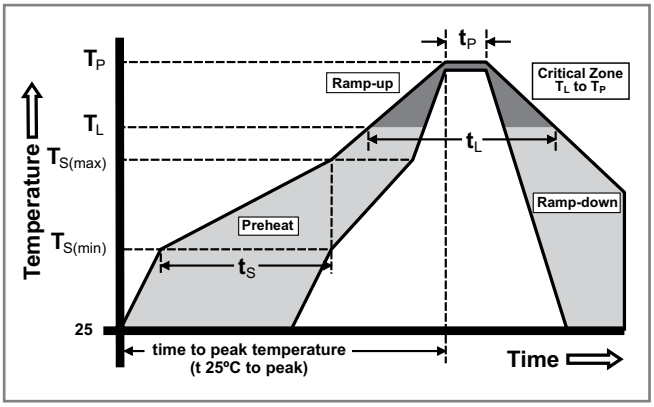
Average Time Current Curves



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 – 150 seconds
Peak Temperature (T_P)		$250^{+0/-5}$ °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	260°C, 10 seconds max.



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Surface Mount Fuses

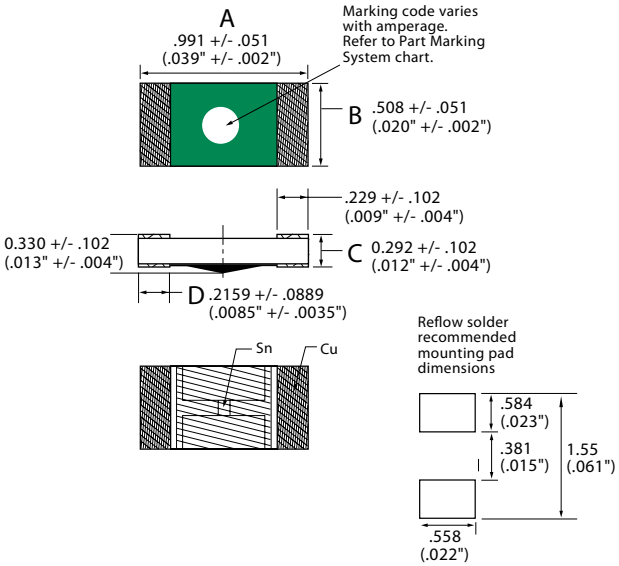
Thin Film > 0402 Size > Very Fast-Acting > 435 Series

Product Characteristics

Materials	**Body:** Epoxy / Glass Substrate; Parts with 'HF' suffix: Halogen Free Epoxy / Glass **Terminations:** 100% Tin over Nickel over Copper **Device Weight:** 0.316mg
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Insulation Resistance	After Opening: Greater than 10,000Ohms

Operating Temperature	–55°C to 90°C. Consult temperature re-rating curve chart. For operation above 90°C please contact Littelfuse.
Thermal Shock	Withstands 5 cycles of –55°C to 125°C
Vibration	MIL-STD-202, Method 201

Dimensions



	A	B	C	D
inch min	0.037	0.018	0.008	0.005
inch max	0.041	0.022	0.016	0.012
mm min	0.94	0.457	0.190	0.127
mm max	1.04	0.559	0.394	0.305

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
8mm Tape and Reel	EIA-481 Rev. D (IEC 60286, part 3)	10000	KR

Part Marking System

Amp Code	Marking Code
.250	X
.375	
.500	
.750	
001.	
1.25	
01.5	
1.75	
002.	
02.5	
003.	
03.5	
004.	
005.	

Part Numbering System

0435 002. K R HF S

SERIES

Refer to Amp Code column in the Electrical Specifications table.
The dot is positioned at the end of the number sequence with whole ratings and within for fractional ratings.
Example: 1.5 amp product is 0435**01.5**KRHF (2 amp product shown)

QUANTITY Code
K = 10,000 Pieces

PACKAGING Code
R = Tape and Reel

HALOGEN FREE ITEM

"S" - for .250A only

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Surface Mount Fuses

NANO²® Fuse > Very Fast-Acting > 448 Series

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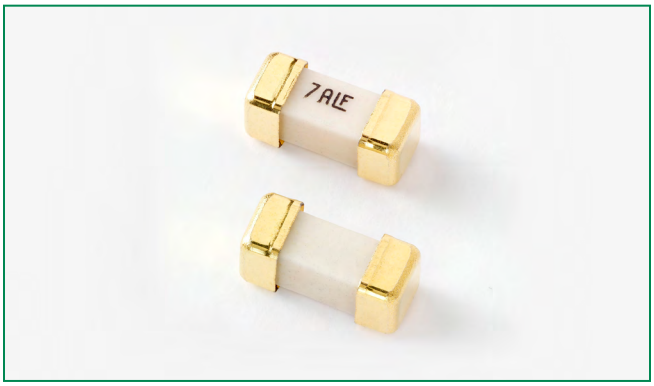
448 Series Fuse



Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.062A - 15A
	29862	0.062A - 15A
	NBK030205-E10480A NBK030205-E10480B	1A - 1.6A 2A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	1/16 –15	4 hours, Minimum
200%	1/16 –10	5 sec., Maximum
	12 –15	20 sec., Maximum

Description

The lead-free Nano²® SMF Fuse is a very small, square surface mount fuse that is RoHS compliant, Halogen Free and 100% lead-free. This product is fully compatible with lead-free solder alloys and higher temperature profiles associated with lead-free assembly.

Features

- RoHS compliant, Lead-free and Halogen Free
- Very fast-acting
- Small size
- Wide range of current rating available (0.062A to 15A)
- Wide operating temperature range
- Low temperature de-rating

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

Additional Information

Datasheet | **Resources** | **Samples**

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Revised: 03/03/17

Surface Mount Fuses

NANO²® Fuse > Very Fast-Acting > 448 Series

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals		
0.062	.062	125	50A @125VAC/VDC 300A @32 VDC PSE: 100A @100VAC	5.56	0.00023	x	x	
0.080	.080	125		4.47	0.00043	x	x	
0.100	.100	125		2.94	0.00082	x	x	
0.125	.125	125		2.05	0.00130	x	x	
0.160	.160	125		1.67	0.00280	x	x	
0.200	.200	125		1.24	0.00380	x	x	
0.250	.250	125		0.95	0.01520	x	x	
0.315	.315	125		0.7015	0.02650	x	x	
0.375	.375	125		0.6155	0.02400	x	x	
0.400	.400	125		0.4895	0.04160	x	x	
0.500	.500	125		0.3800	0.10000	x	x	
0.630	.630	125		0.3125	0.121	x	x	
0.750	.750	125		0.2290	0.206	x	x	
0.800	.800	125		0.1907	0.272	x	x	
1.00	001.	125		0.08630	0.441	x	x	x
1.25	1.25	125		0.06619	0.900	x	x	x
1.50	01.5	125		0.06514	0.900	x	x	x
1.60	01.6	125		0.06261	1.122	x	x	x
2.00	002.	125		0.03529	0.812	x	x	x
2.50	02.5	125		0.02934	1.156	x	x	x
3.00	003.	125		0.02445	1.720	x	x	x
3.15	3.15	125		0.02300	1.810	x	x	x
3.50	03.5	125		0.02100	2.300	x	x	x
4.00	004.	125		0.01577	3.970	x	x	x
5.00	005.	125		0.01531	4.490	x	x	x
6.30	06.3	125		0.01044	12.10	x	x	x
7.00	007.	125		0.00900	13.92	x	x	x
8.00	008.	125		0.00780	18.33	x	x	x
10.00	010.	125	35A @125 VAC 50A @125 VDC 300A @32 VDC PSE: 100A @100VAC	0.00700	28.00	x	x	x
12.00	012.	85	50A @65 VAC/VDC 300A @24 VDC 200A @85 VDC	0.00533	47.59	x	x	
15.00	015.	85		0.00394	78.4	x	x	

Notes:
- I²t calculated at 8ms.
- Resistance is measured at 10% of rated current, 25°C

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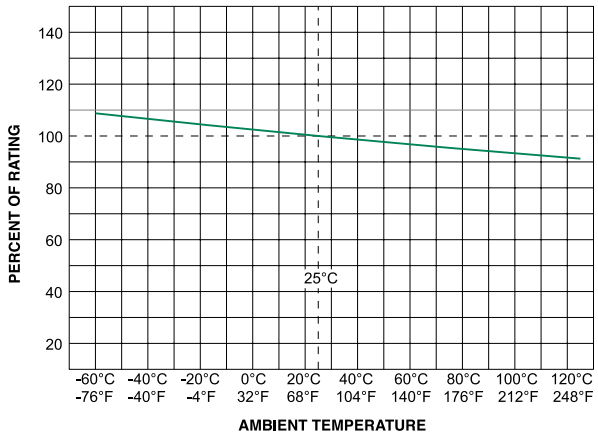
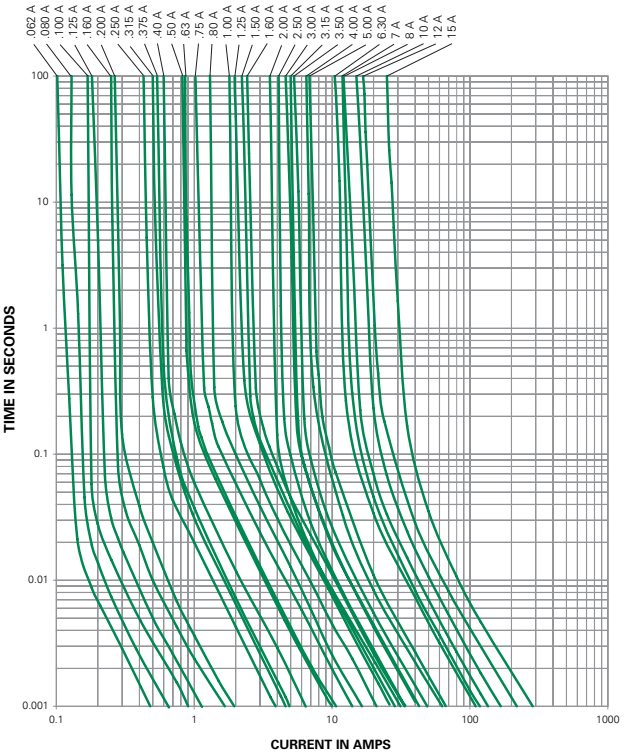
Temperature Re-rating Curve



Note:

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

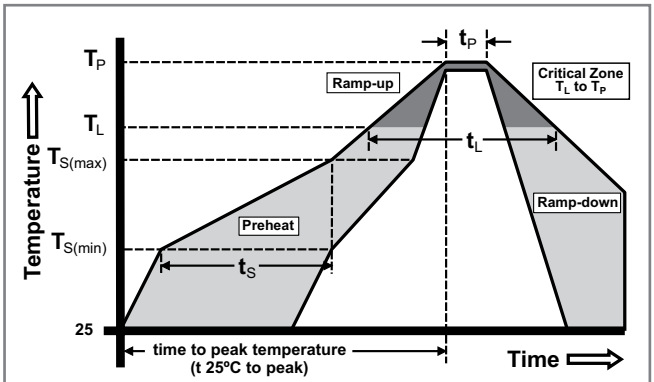
Average Time Current Curves



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)		$260^{+0/-5}$ °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.



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Surface Mount Fuses

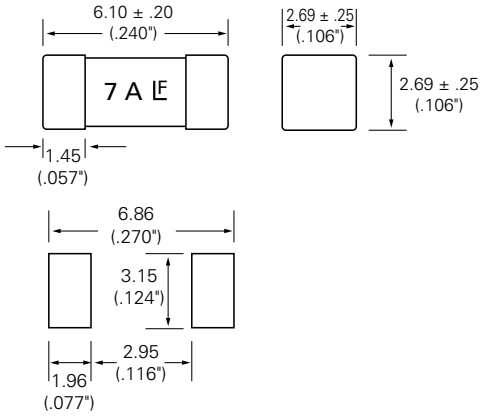
NANO2® Fuse > Very Fast-Acting > 448 Series

Product Characteristics

Materials	Body: Ceramic Terminations: Gold-plated Caps
Product Marking	Brand, Amperage Rating
Operating Temperature	-55°C to 125°C
Moisture Sensitivity Level	Level 1, J-STD-020
Solderability	MIL-STD-202, Method 208
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum)

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

Dimensions



Recommended pad layout

Part Numbering System

0448 001. M R

SERIES

AMP Code*
Refer to Electrical Characteristics table

QUANTITY Code
M = 1000 pcs

PACKAGING Code
R = Tape and Reel

***Example:**
1.5 amp product is 044801.5MR
(1 amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
12mm Tape and Reel	EIA RS-481-1 (IEC 286, part 3)	1000	MR

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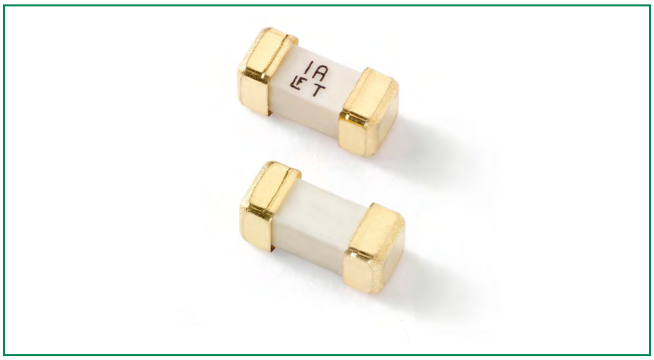
449 Series Fuse



Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
c UL us	E10480	0.375A - 5A
PS E	NBK030205-E10480B	1A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	1 sec., Min.; 60 sec., Max.
300%	0.2 sec., Min.; 3 sec., Max
800%	0.02 sec., Min.; 0.1 sec., Max.

Additional Information

Datasheet | **Resources** | **Samples**

Description

The lead free NANO²® Slo-Blo® fuse is RoHS compliant, Halogen Free and 100% lead-free. This product is fully compatible with lead-free solder alloys and higher temperature profiles associated with lead-free assembly. The Slo-Blo® fuse design has enhanced inrush withstand characteristics over the NANO²® Fast-Acting Fuse. The unique time delay feature of this fuse design helps solve the problem of nuisance "opening" by accommodating inrush currents that normally cause a fast-acting fuse to open.

Features

- Lead-free, Halogen free and RoHS compliant
- Small size
- Wide range of current ratings available
- Wide operating temperature range
- Low temperature rerating

Applications

Secondary protection for space constrained 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 Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals	
						c UL us	PS E
0.375	.375	125	50A @125 VAC/VDC PSE: 100A @100 VAC	1.5130	0.088	x	
0.500	.500	125		0.7633	0.258	x	
0.750	.750	125		0.4080	0.847	x	
1.00	001.	125		0.2516	1.76	x	x
1.50	01.5	125		0.1186	4.70	x	x
2.00	002.	125		0.0708	6.76	x	x
2.50	02.5	125		0.0400	13.18	x	x
3.00	003.	125		0.0352	19.55	x	x
3.50	03.5	125		0.0261	32.70	x	x
4.00	004.	125		0.0227	40.80	x	x
5.00	005.	125		0.0171	59.59	x	x

Notes: - I²t calculated at 8ms. Resistance is measured at 10% of rated current, 25°C

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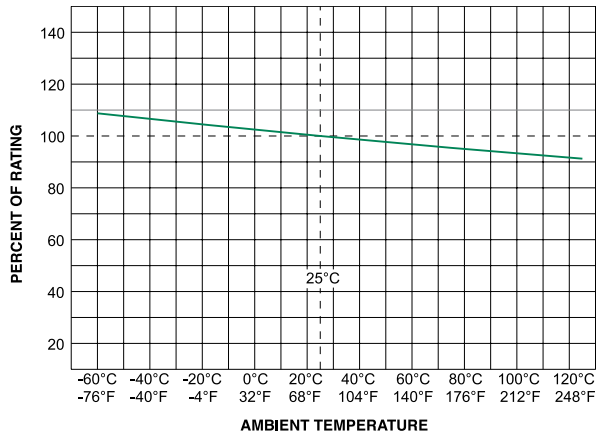
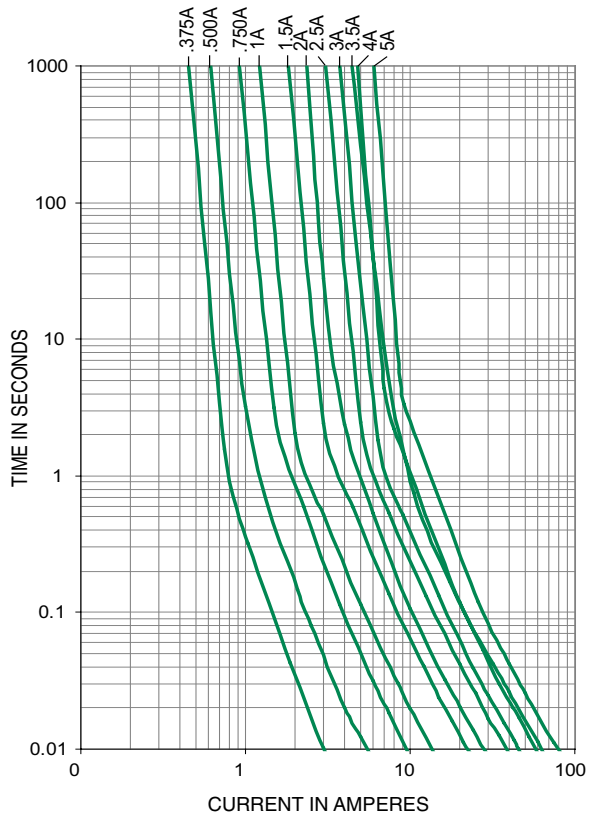
Temperature Re-rating Curve



Note:

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

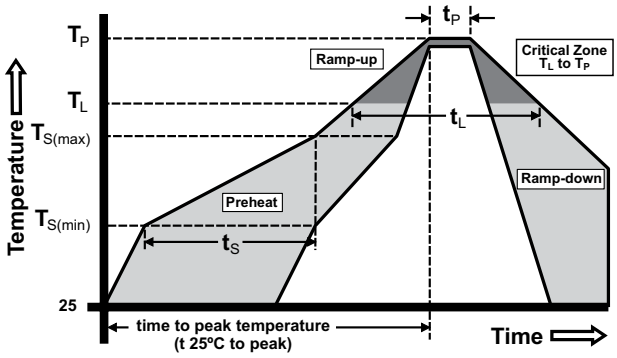
Average Time Current Curves



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		3°C/second max.
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max.
Reflow	-Temperature (T_L) (Liquidus)	217°C
	-Temperature (t_L)	60 – 90 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °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, 3 seconds max.



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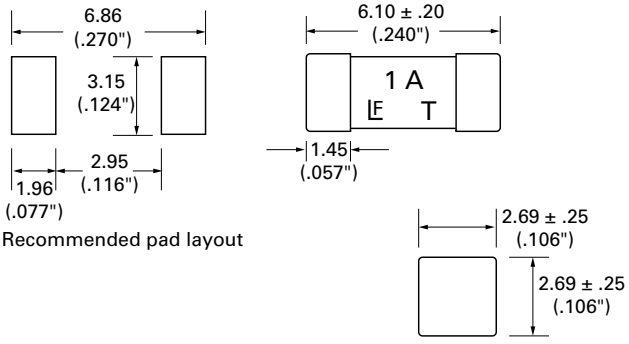
Product Characteristics

Materials	**Body:** Ceramic **Terminations:** Gold-plated Caps
Product Marking	Brand, Amperage Rating
Operating Temperature	-55°C to 125°C
Moisture Sensitivity Level	Level 1, J-STD-020
Solderability	MIL-STD-202, Method 208
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum)

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

Dimensions



Part Numbering System

0449 001. M R

SERIES

AMP Code*
Refer to Electrical characteristics table

QUANTITY Code
M = 1000 pcs

PACKAGING Code
R = Tape and Reel

***Example:**
0.375 Amp product is 0449.**375**MR
(1 amp product shown above).

Packaging

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

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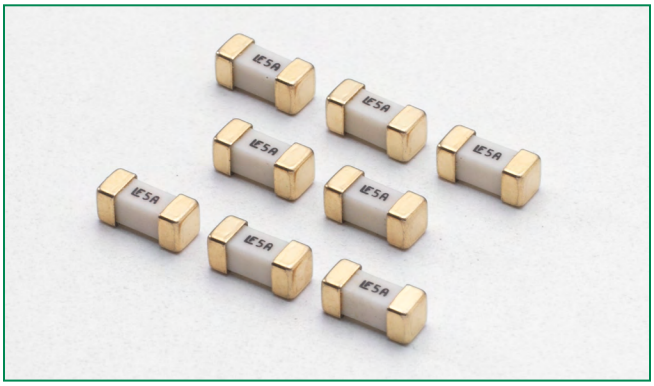
451/453 Series Fuse



Agency Approvals

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

Additional Information

Datasheet 451 Series
Resources 451 Series
Samples 451 Series
Datasheet 453 Series
Resources 453 Series
Samples 453 Series

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

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

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

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Revised: 03/03/17

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals			
						c UL us		PS E	c UL us
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	x	
15.0	015.	65		0.0037	97.82	x	x	x	
20.0	020.	65		0.00244	154	x			

Notes:
- I²t calculated at 8ms.
- Resistance is measured at 10% of rated current, 25°C

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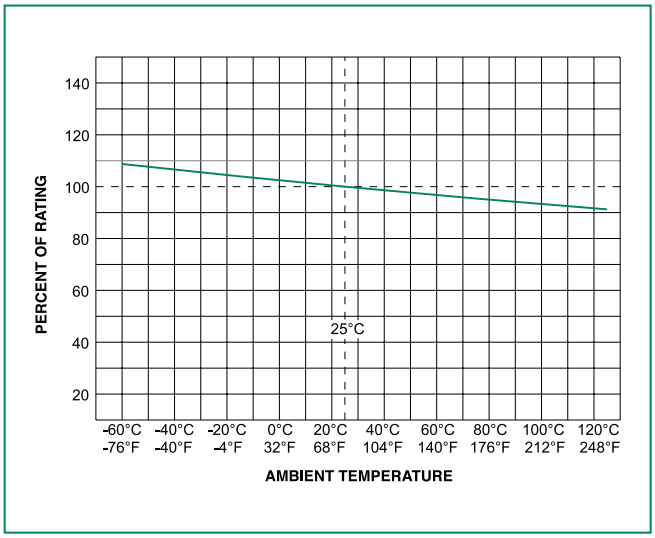
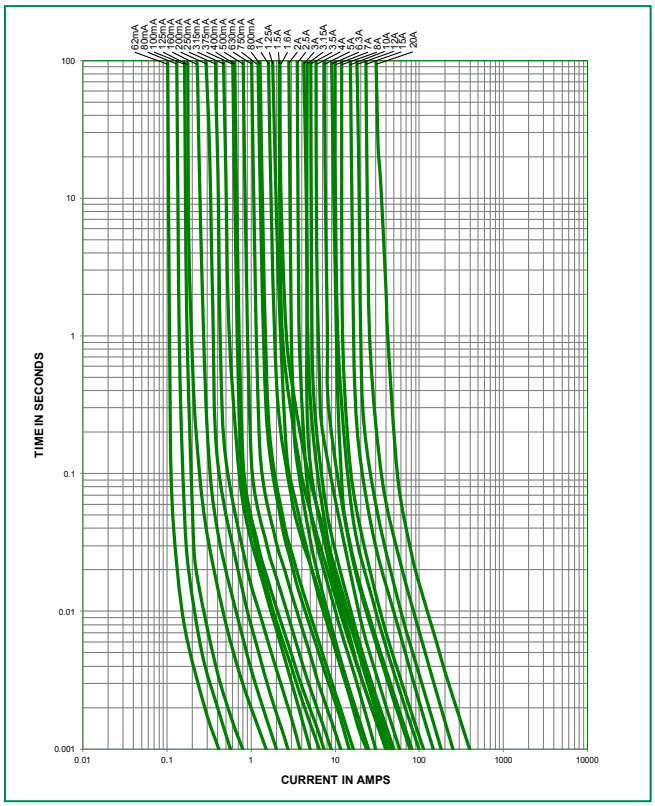
Temperature Re-rating Curve



Note:

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

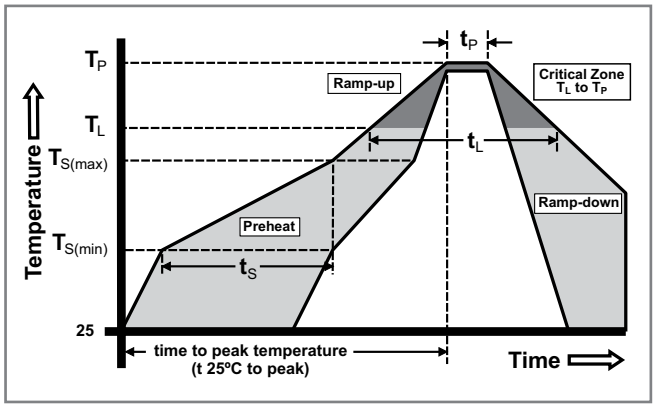
Average Time Current Curves



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)		$260^{+0/-5}$ °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.



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Surface Mount Fuses

NANO²® > Very Fast-Acting Fuse > 451/453 Series

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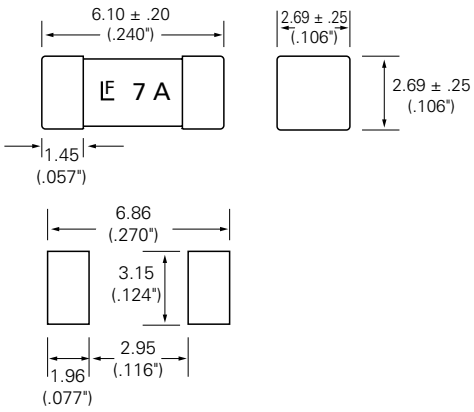
Product Characteristics

Materials	**Body:** Ceramic **Terminations**: 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)
Product Marking	Brand, Ampere Rating
Operating Temperature	–55°C to 125°C
Moisture Sensitivity Level	Level 1, J-STD-020
Solderability	MIL-STD-202, Method 208
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum)

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

Dimensions



Recommended pad layout

Part Numbering System

0451 001. M R L

SERIES
451 = Gold / SnPb / Silver Plated Caps
453 = Silver Plated Caps

AMP Code
Refer to Electrical characteristics table

QUANTITY Code
M = 1000 pcs
N = 5000 pcs

PACKAGING Code
R = Tape and Reel

L-RoHS Compliant & Halogen Free (Gold Plated Caps)

SN-RoHS Compliant & Halogen Free (Sn-dipped Caps)

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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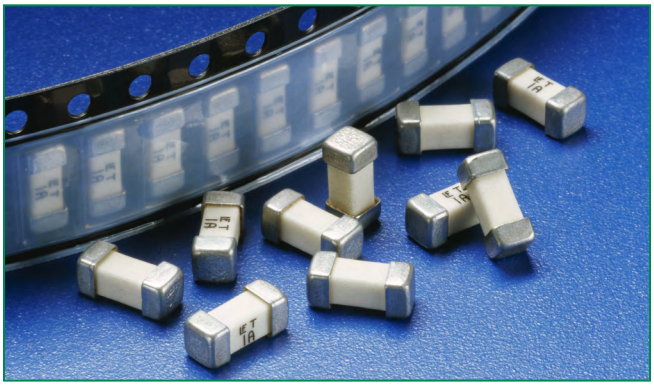
452/454 Series Fuse



Description

The NANO²® Slo-Blo® fuse has enhanced inrush withstand characteristics over the NANO²® Fast-Acting fuse. The unique time delay feature of this fuse design helps solve the problem of nuisance "opening" by accommodating inrush currents that normally cause a fast-acting fuse to open.

Features

- Small size
- Wide range of current rating available (0.375A to 12A)
- Wide operating temperature range
- Low temperature rerating
- RoHS compliant and Halogen Free

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

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.375A - 12A
	29862	0.375A - 12A
	NBK030205-E10480B	1A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	1 sec., Min.; 60 sec., Max.
300%	0.2 sec., Min.; 3 sec., Max
800%	0.02 sec., Min.; 0.1 sec., Max.

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals		
0.375	.375	125	50A @ 125 VAC/VDC 300A @ 32 VDC PSE: 100A @ 100 VAC	1.2000	0.101	x	x	
0.500	.500	125		0.7000	0.240	x	x	
0.750	.750	125		0.3600	0.904	x	x	
001.	001.	125		0.2250	1.98	x	x	x
1.50	01.5	125		0.0930	3.65	x	x	x
2.00	002.	125		0.0625	8.20	x	x	x
2.50	02.5	125		0.0450	15.0	x	x	x
3.00	003.	125		0.0340	20.16	x	x	x
3.50	03.5	125		0.0224	26.53	x	x	x
4.00	004.	125		0.0186	34.40	x	x	x
5.00	005.	125		0.0136	53.72	x	x	x
7.00	007.	75	50A @ 72 VAC 50A @ 60 VDC 100A @ 75 VDC	0.0105	123.83	x	x	
8	008.	75		0.0088	137.34	x	x	
12	012.	75		0.0061	260.46	x	x	

Notes:
- I²t calculated at 8ms.
- Resistance is measured at 10% of rated current, 25°C

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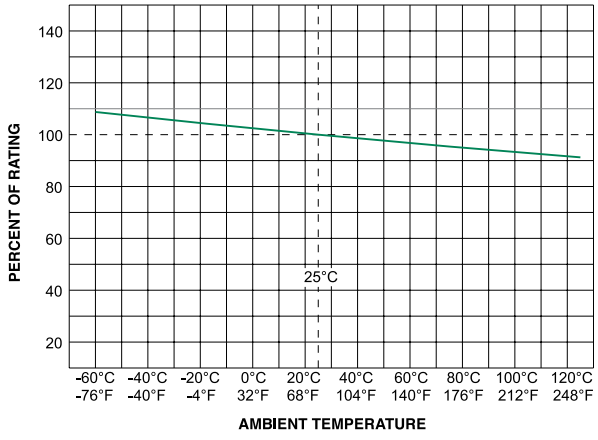
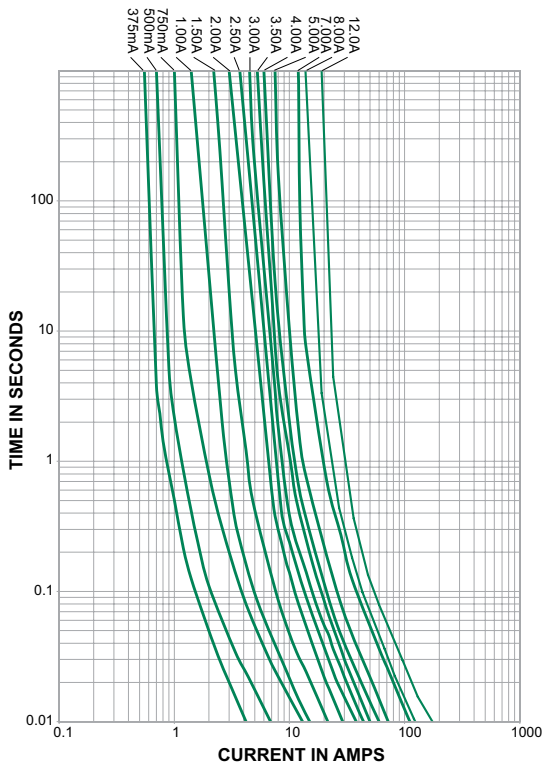
Temperature Re-rating Curve



Note:

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

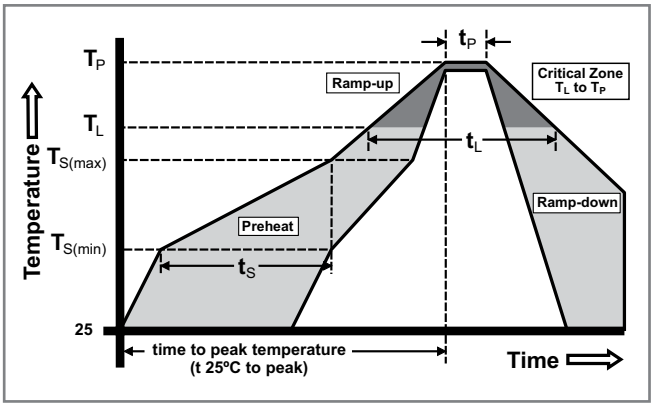
Average Time Current Curves



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)		$260^{+0/-5}$ °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, 3 seconds max.



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Surface Mount Fuses

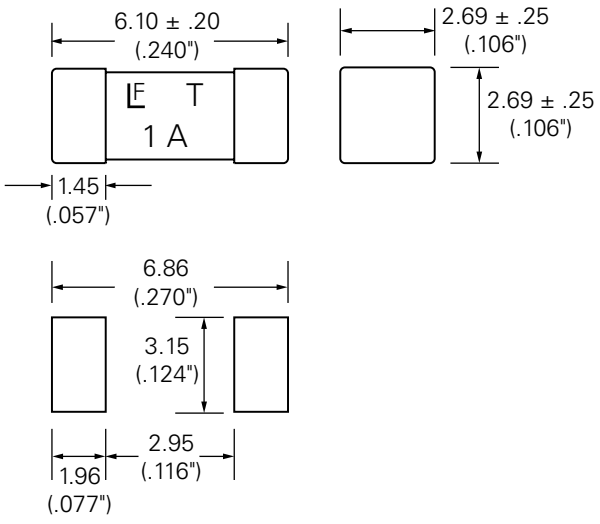
NANO²® > Slo-Blo® Fuse > 452/454 Series

Product Characteristics

Materials	**Body:** Ceramic **Terminations**: Gold-plated Caps / Sn-dipped Silver Plated Caps (452 Series) Silver-plated Caps (454 Series)
Product Marking	Brand, Ampere Rating
Operating Temperature	-55°C to 125°C
Moisture Sensitivity Level	Level 1, J-STD-020
Solderability	MIL-STD-202, Method 208
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum)

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

Dimensions



Recommended pad layout

Part Numbering System

0452 001. M R L

SERIES

AMP Code
Refer to Amp Code column in the Electrical Specifications table.
The dot is positioned at the end of the number sequence with whole ratings and within for fractional ratings.
Example: 0.375 Amp product is 0452.**375**MRL (1 amp product shown)

QUANTITY Code
M = 1000 pcs
N = 5000 pcs

PACKAGING Code
R = Tape and Reel

L - RoHS Compliant & Halogen Free (Gold Plated Caps)

SN-RoHS Compliant & Halogen Free (Sn-dipped Caps)

Notes:
452 series may be ordered as "RoHS and HF (Gold Plated Caps)" ("L" suffix).
454 series is available only as "RoHS and HF" version and does not require "L" suffix.
Please do not include "L" suffix within 454 series ordering instructions.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
12mm Tape and Reel	EIA RS-481-1 (IEC 286, part 3)	5000	NR
12mm Tape and Reel	EIA RS-481-1 (IEC 286, part 3)	1000	MR

Additional Information

Datasheet 452 Series | **Resources 452 Series** | **Samples 452 Series**

Datasheet 454 Series | **Resources 454 Series** | **Samples 454 Series**

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Surface Mount Fuses

NANO²® > Very Fast Acting Fuse > 456 Series

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456 Series Fuse

Description

The High Current NANO²® Fuse is a small square surface mount fuse that is designed to support higher current requirements of various applications.

Features

- Surface mount high current fuse
- Fully compatible with lead-free solder alloys and higher temperature profiles associated with lead-free assembly
- RoHS compliant and Halogen Free
- Available in ratings of 20 to 40 Amperes

Applications

- Voltage regulator module for PC server
- Cooling fan system for PC server
- Storage system power
- Basestation power supply

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RATING
c UL us	E10480	20A - 40A
	T50291892	20A - 30A
PS E	NBK030308-JP1021	20A - 30A
	29862	20A - 40A

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	60 seconds, Maximum

Additional Information

Datasheet | Resources | Samples

Electrical Specifications

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A² Sec.)	Nom Voltage Drop (mV)	Agency Approvals			
							c UL us		PS E	
20	020.	125	100A @125VAC 300A @ 65VAC 300A @ 100VDC 1000A @ 32VDC 500A @ 72VDC	0.00230	18	64.7	x	x	x	x
25	025.	125	100A @ 125VAC 300A @ 65VAC 500A @ 72VDC 1000A @ 32VDC	0.00192	45	68.38	x	x	x	x
30	030.	125	100A @ 125VAC 300A @ 65VAC 1000A @ 32VDC 500A @ 72VDC	0.00132	81	69.9	x	x	x	x
40	040.	72	180A @ 72VDC 600A @ 60VDC	0.00105	191	55	x			x

Notes:
1. Cold resistance measured at less than 10% of rated current at 23°C.
2. Agency Approval Table Key: X=Approved or Certified, P=Pending.
3. I²t values stated for 1 msec opening time.

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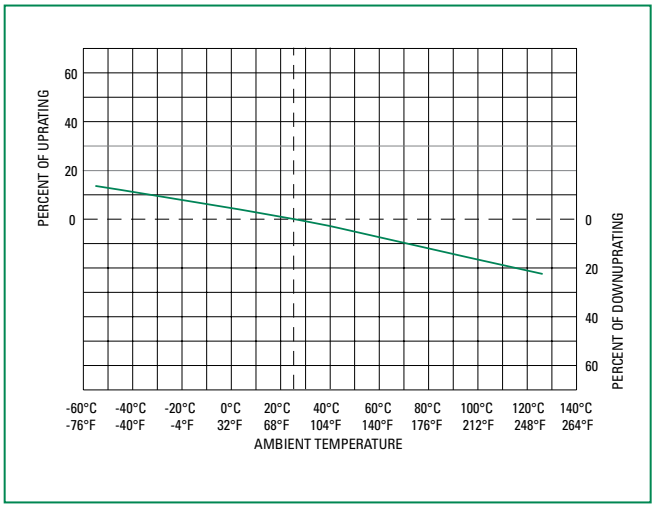
Surface Mount Fuses

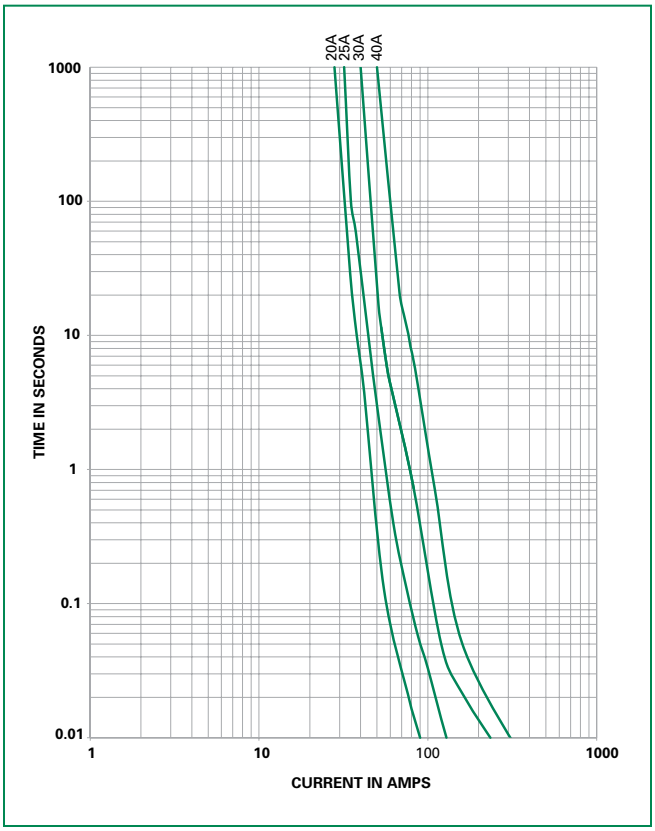
NANO2® > Very Fast Acting Fuse > 456 Series

Temperature Re-rating Curve



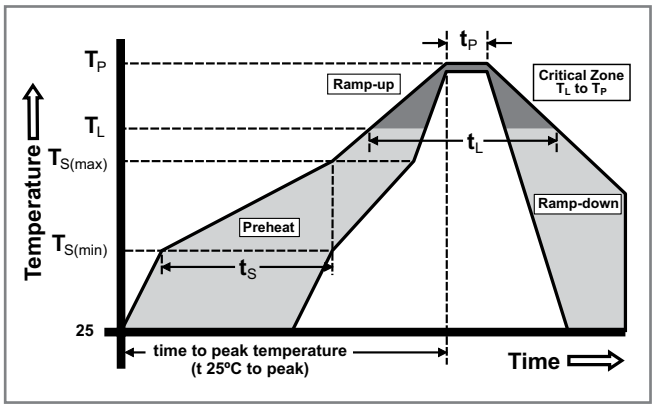
Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters – Reflow Soldering

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 – 180 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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °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



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Surface Mount Fuses

NANO²® > Very Fast Acting Fuse > 456 Series

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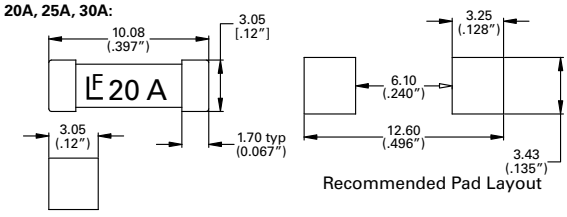
Product Characteristics

Materials	Body: Ceramic Cap: Silver Plated Brass
Product Marking	Body: Brand Logo, Current Rating
Insulation Resistance	MIL-STD-202, method 302, Test Condition A (10,000 ohms, Minimum)
Solderability	MIL-STD-202, Method 208
Resistance to Soldering Heat	MIL-STD-202, Method 210, Test Condition B (10 sec at 260°C)
PCB Recommendation for Thermal Management	Min. copper layer thickness = 100µm Min. copper trace width =20A, 30 10mm (20A, 30A) / 15mm (40A) Alternate methods of thermal management may be used. In such cases, under normal operations, the maximum temperature of the fuse body should not exceed 90°C in a 25°C environment.

Operating Temperature	-55°C to 125°C with proper derating
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles -65°C to 125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Moisture Sensitivity Level	J-STD-020, Level 1
Moisture Resistance	MIL-STD-202 Method 106, High Humidity (90-98%RH), Heat (65°C)
Salt Spray	MIL-STD-202, Method 101, Test Condition B
Mechanical Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)

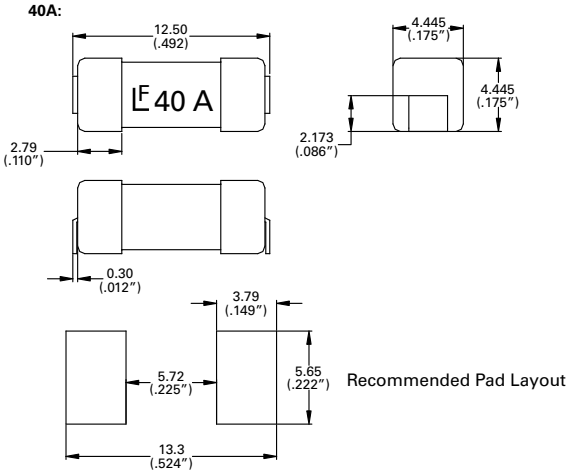
Dimensions

20A, 25A, 30A:



Recommended Pad Layout

40A:



Recommended Pad Layout

Part Numbering System

0456 020. E R

SERIES

AMP Code
Refer to Electrical characteristics table

QUANTITY Code
E = 2500 pcs
D = 1500 pcs

PACKAGING Code
R = Tape and Reel

Packaging

Rating	Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
20A, 25A, 30A	24 mm Tape and Reel	EIA RS-481-2	2500	ER
40A	24 mm Tape and Reel	EIA RS-481-2 (IEC 286, part 3)	1500	DR

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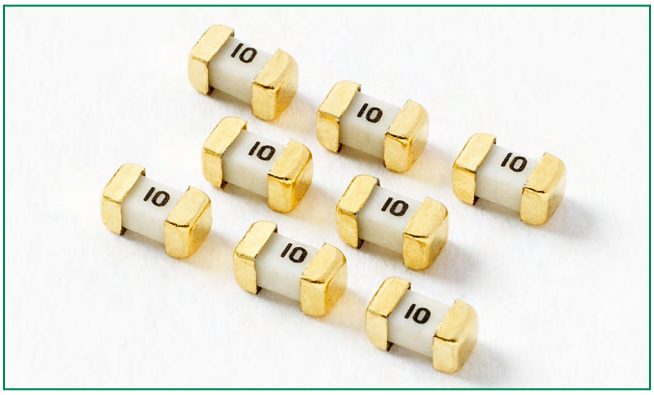
Surface Mount Fuses

NANO²® > 458 Series 1206 Size Inrush Withstand Fuse

458 Series Fuse

RoHS HF c UL us



Description

The 458 Series Nano²® Fuse is an ultra-small, square surface mount fuse designed to support a variety of space constrained overcurrent protection applications. Offering a 1206 size footprint, it is the smallest wire-in-air type surface mount fuse offered by Littelfuse.

Features

- Surface Mount Fuse
- Fully compatible with lead free soldering profiles
- RoHS Compliant and Halogen-Free
- Available in ratings of 1 to 10 Amperes

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
c UL us	E10480	1A–10A

Applications

- Notebook PC
- LCD backlight inverter
- LCD Panel
- DC/DC converter
- Battery Pack
- Car Navigation System
- Network Equipment
- Telecom Equipment
- Electronic Signage
- Portable Consumer Electronics

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
250%	5 seconds, Maximum

Additional Information

Datasheet | Resources | Samples

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Marking	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals c UL us
1.0	001.	1	75V	50A @ 75VDC 50A @ 48VAC	0.180	.168	x
1.25	1.25	1.25			0.125	.313	x
1.5	01.5	1.5			0.099	.548	x
1.6	01.6	1.6			0.092	.562	x
2	002.	2			0.0695	.952	x
2.5	02.5	2.5			0.06	1.408	x
3	003.	3			0.049	2.289	x
3.15	3.15	3.15			0.045	2.457	x
3.5	03.5	3.5			0.0375	4.00	x
4	004.	4		50A @ 75VDC 50A @ 32VAC	0.032	4.832	x
5	005.	5			0.027	7.938	x
6.3	06.3	6.3			0.0192	14.37	x
7	007.	7	63V	50A @ 63VDC 50A @ 32VAC	0.0175	20.48	x
8	008.	8			0.0058	13.448	x
10.0	010.	10			0.00465	15.0	x

Notes:
1. I²t values stated for 8 msec opening time
2. Cold resistance measured at less than 10% of rated current at 25°C.
3. Agency Approval Table Key: X=Approved or Certified, P=Pending and Blank=Not Approved
4. Have special electrical characteristic needs? Contact Littelfuse to learn more about application specific options.

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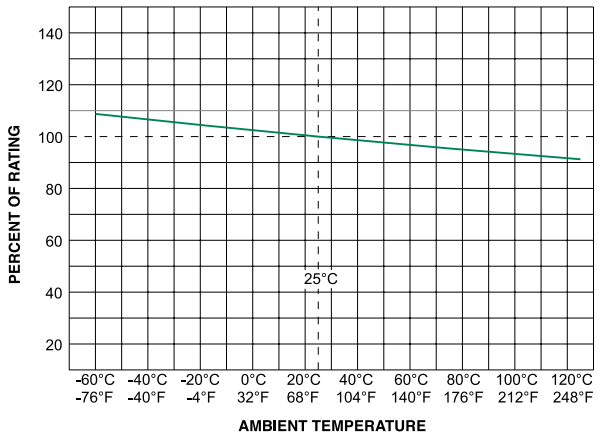
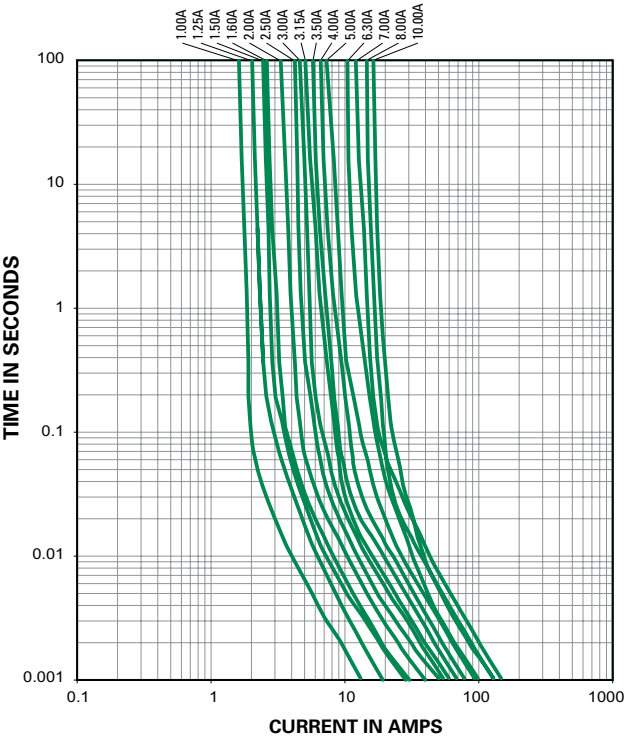
Temperature Re-rating Curve



Note:

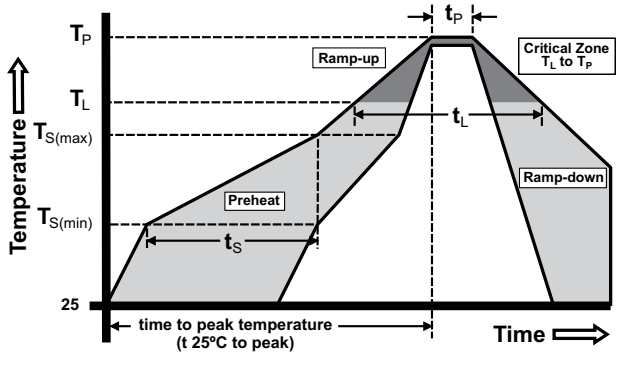
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

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)		$260^{+0/-5}$ °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



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Surface Mount Fuses

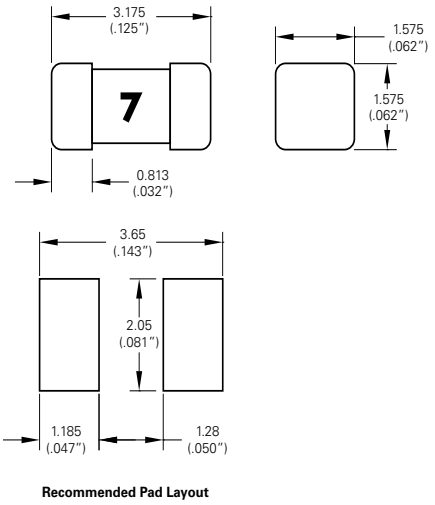
NANO²® > 458 Series 1206 Size Inrush Withstand Fuse

Product Characteristics

Materials	Body: Ceramic Cap: Gold Plated Brass
Product Marking	Body: Current Rating (Refer to Electrical Characteristic table)
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms, Minimum)
Solderability	MIL-STD-202, Method 208
Resistance to Soldering Heat	MIL-STD-202, Method 210, Test Condition B (10 sec at 260°C)
Moisture Sensitivity Level	Level 1 J-STD-020

Operating Temperature	–55°C to 125°C with proper derating
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Moisture Resistance	MIL-STD-202, Method 106, High Humidity (90-98% RH), Heat (65°C)
Salt Spray	MIL-STD-202, Method 101, Test Condition B
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)

Dimensions



Recommended Pad Layout

Part Numbering System

0458 001. D R

SERIES

AMP Code
Refer to Electrical characteristics table

QUANTITY Code
D: 1500 pcs

PACKAGING Code
R: Tape and Reel

Example:
1.5 amp product is 0458 D R (1 amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
8mm Tape and Reel	EIA-RS 481-1	1500	DR

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Surface Mount Fuses

NANO²® > 250V > Slo-Blo® Fuse > 443 Series

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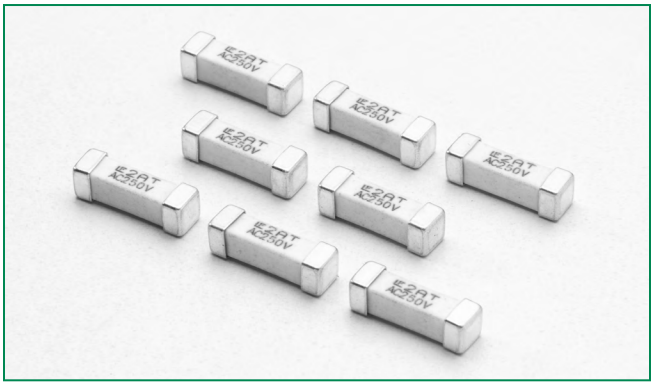
443 Series Fuse



Description

The 250V Nano²® Fuse is a small square surface mount fuse that is designed to enable compliance with the RoHS directive. This product is fully compatible with lead-free solder alloy and higher temperature profiles associated with lead-free assembly.

Features

- 250 VAC voltage rating
- Slo-Blo® Fuse
- Available 0.50A – 5.00A
- RoHS Compliant
- Fully compatible with lead-free solder alloys and higher temperature profiles associated with lead-free assembly

Applications

- AC/DC power adaptor
- Telecom equipment system power
- Portable system built-in AC/DC converter
- Lighting System
- LED Lighting

Additional Information

Datasheet | **Resources** | **Samples**

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
c UL us	E10480	0.500A - 5.00A
KC	SU05024 -14004 SU05024 -14003 SU05024 -14002	0.500A - 0.750A 1.00A - 2.50A 3.00A - 5.00A
PSE	NBK290416-JP1021	1.00A – 5.00A
TÜV	R50310551	0.500A - 5.00A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
250%	120 seconds, Maximum

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Nominal Voltage Drop (mV)	Agency Approvals			
							c UL us	KC	PSE	TÜV
0.50	.500	250	50A @250VAC	0.600	1.61	448	x	x		x
0.75	.750	250		0.275	3.025	285	x	x		x
1	001.	250		0.180	10.17	234	x	x	x	x
1.50	01.5	250		0.100	14.72	196	x	x	x	x
2	002.	250		0.052	18.06	154	x	x	x	x
2.50	02.5	250		0.035	18.13	139	x	x	x	x
3	003.	250		0.028	51.44	113	x	x	x	x
3.50	03.5	250		0.019	53.14	98	x	x	x	x
4	004.	250		0.016	122.5	81	x	x	x	x
5	005.	250		0.0115	180.6	80	x	x	x	x

Notes:

1. Cold resistance measured at less than 10% of rated current at 23°C.
2. Agency Approval Table Key: X=Approved or Certified, P=Pending and Blank=Not Approved
3. Have special electrical characteristic needs? Contact Littelfuse to learn more about application specific options.

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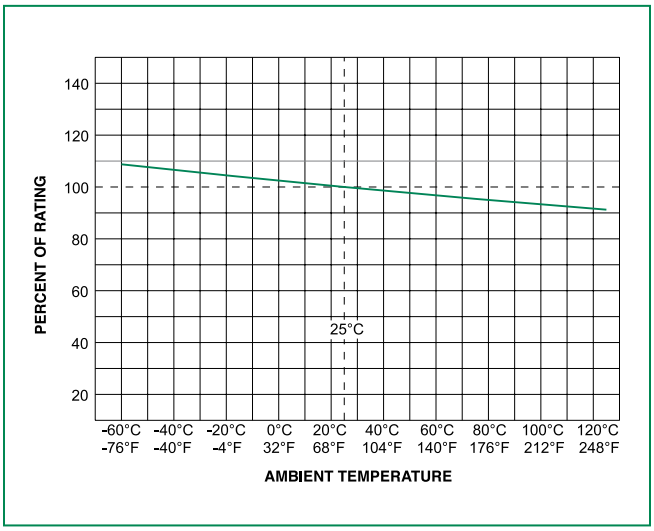
Surface Mount Fuses

NANO2® > 250V > Slo-Blo® Fuse > 443 Series

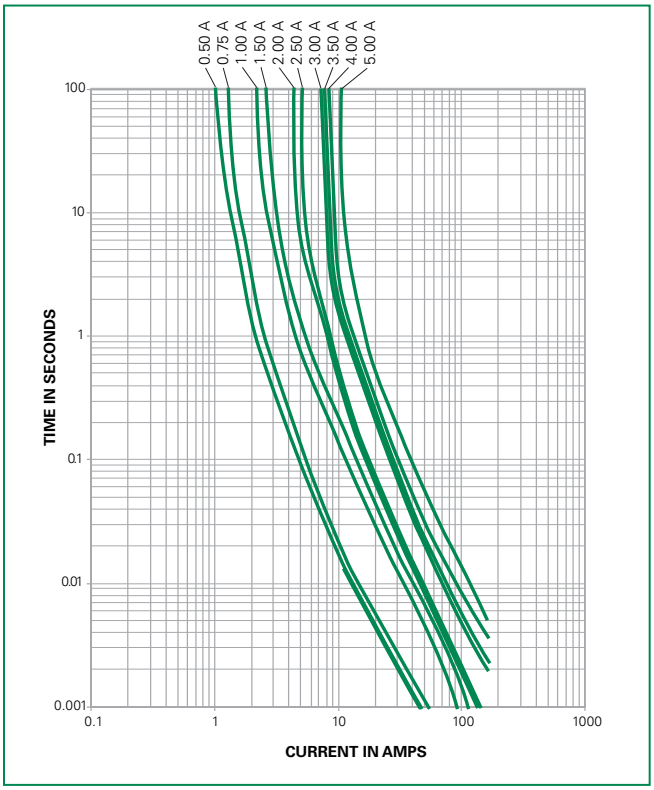
Temperature Re-rating Curve



Note:

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

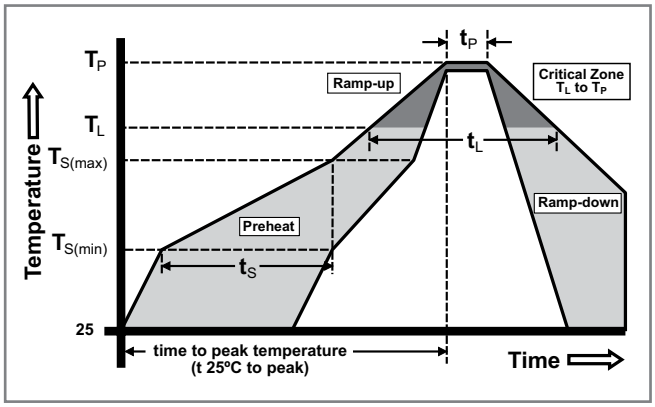
Average Time Current Curves



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)		$260^{+0/-5}$ °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, 3 seconds max.



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Surface Mount Fuses

NANO²® > 250V > Slo-Blo® Fuse > 443 Series

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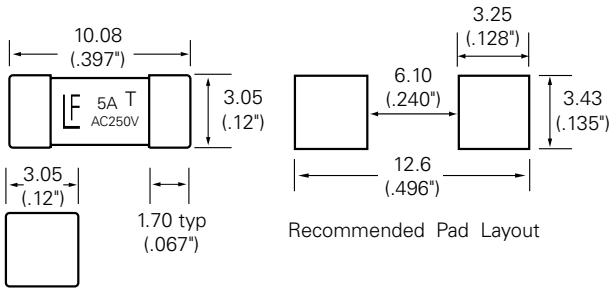
Product Characteristics

Materials	Body: Ceramic Cap: Silver Plated Brass
Product Marking	Body: Brand Logo, Current Rating Rated Voltage, and T - Characteristic "T"
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms, Minimum)
Solderability	MIL-STD-202, Method 208
Resistance to Soldering Heat	MIL-STD-202, Method 210, Test Condition B (10 sec at 260°C)
Moisture Sensitivity Level	Level 1 J-STD-020
PCB Recommendation for Thermal Management	Min. copper layer thickness = 100um Min. copper trace width = 10mm Alternate methods of thermal management may be used. In such cases, under normal operations, the maximum temperature of the fuse body should not exceed 80°C in a 25°C ambient environment.

Operating Temperature	–55°C to 125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Moisture Resistance	MIL-STD-202, Method 106, High Humidity (90-98% RH), Heat (65°C)
Salt Spray	MIL-STD-202, Method 101, Test Condition B
Mechanical Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)

Dimensions



Part Numbering System

0443 .500 D R

SERIES

AMP Code
Refer to Electrical characteristics table

QUANTITY Code
D = 1500 pcs

PACKAGING Code
R = Tape and Reel

Example:
1.5 amp product is 0443 **01.5** D R (0.5 amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
24mm Tape and Reel	EIA-RS 481-2 (IEC 286, part 3)	1500	DR

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464 Series Fuse

Description

The Surface Mount Nano²® 250V Fuse UMF product family complies with IEC Publication IEC60127-4-Universal Modular Fuse-Links [UMF]. This IEC standard has been accepted world wide.

Features

- Fast-Acting
- Listed to IEC 60127-4, Universal Modular Fuse-Links (UMF)
- 250VAC Voltage rating
- RoHS compliant and Halogen Free

Applications

- Power supply
- Lighting system
- White goods
- Industrial equipment

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
PS E	NBK030205-E10480B	1A - 5A
PS E	NBK101105-E184655	6.3A
UL	E184655	0.25A - 6.3A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
125%	1 hour, Minimum
200%	2 minutes, Maximum
1000%	0.001 sec., Min.; 0.01 sec., Max.

Additional Information

Datasheet | Resources | Samples

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Nominal Voltage Drop (mV)	Agency Approvals	
							PS E	UL
0.500	.500	250	100A@250VAC	0.2373	0.22	600		x
0.800	.800	250		0.1159	0.308	400		x
1.00	001.	250		0.0762	0.51	300	x	x
1.25	1.25	250		0.0580	0.98	300	x	x
1.60	01.6	250		0.0448	1.15	300	x	x
2.00	002.	250		0.0354	2.48	300	x	x
2.50	02.5	250		0.0288	3.99	300	x	x
3.15	3.15	250		0.0206	8.05	300	x	x
4.00	004.	250		0.0156	13.85	300	x	x
5.00	005.	250		0.0119	23.6	300	x	x
6.30	06.3	250		0.0093	35.912	300	x	x

Notes:
- I²t calculated at 8ms.
- Resistance is measured at 10% of rated current, 25°C
- For information and availability of additional ratings please contact Littelfuse

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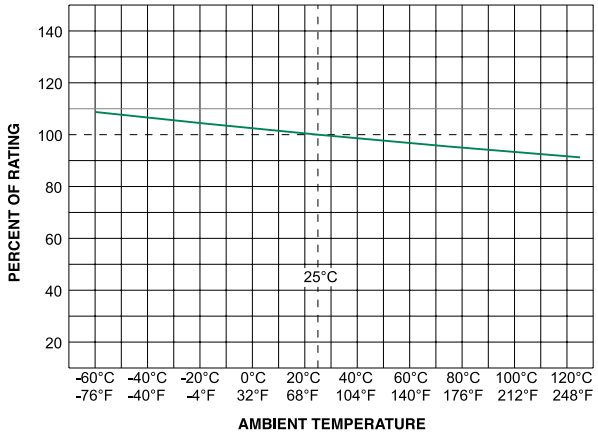
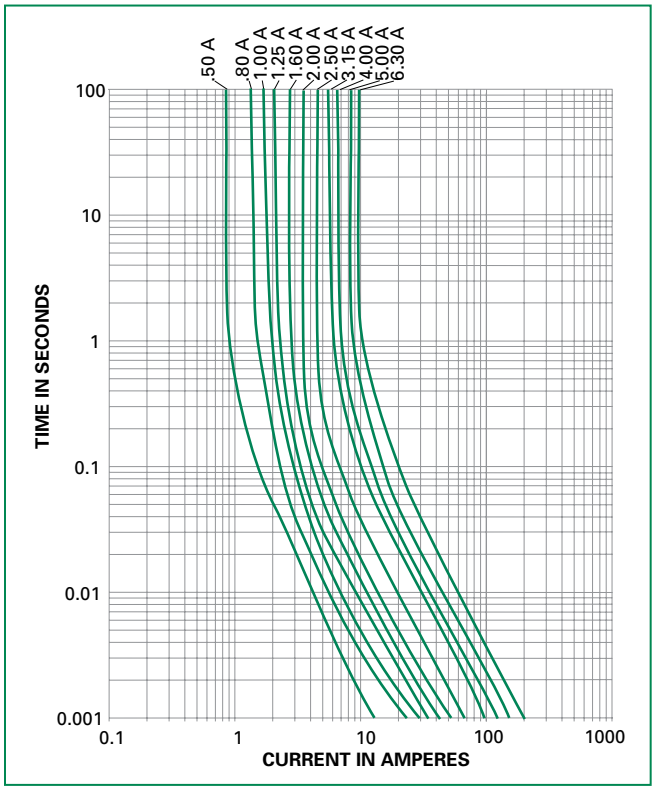
Temperature Re-rating Curve



Note:

1. Rerating depicted in this curve is in addition to the standard derating of 15% for continuous operation.

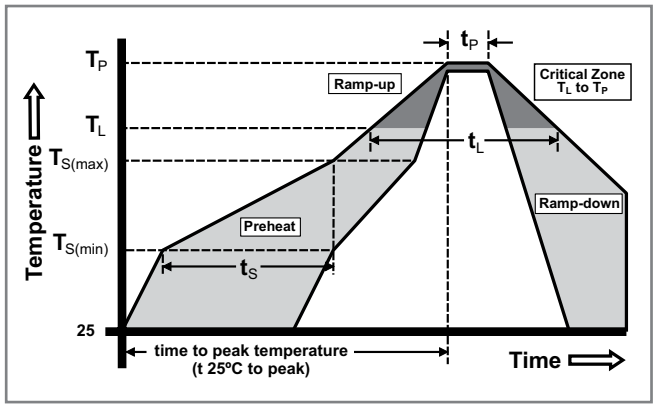
Average Time Current Curves



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)		$260^{+0/-5}$ °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.



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Surface Mount Fuses

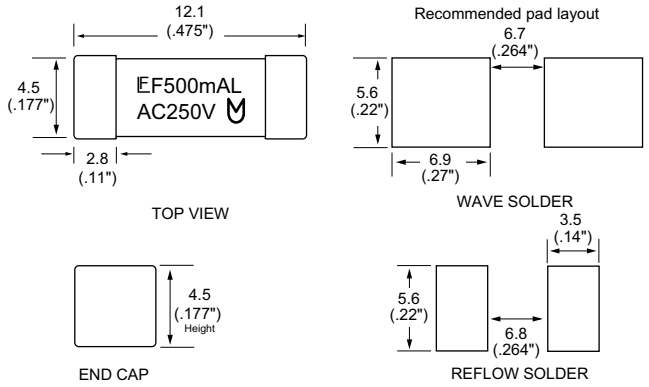
NANO2® > 250V UMF > Fast-Acting Fuse > 464 Series

Product Characteristics

Materials	Body: Ceramic Terminations: Silver-plated Caps
Product Marking	Brand, Ampere Rating, Voltage Rating, UMF Logo
Operating Temperature	-55°C to 125°C
Moisture Sensitivity Level	Level 1, J-STD-020
Solderability	IEC 60127-4
Insulation Resistance (after Opening)	IEC 60127-4 (0.1Mohm min @ 500VDC)

Thermal Shock	MIL-STD-202, Method 107, Test Condition B, 5 cycles, -65°C / +125°C
Mechanical Shock	MIL-STD-202, Method 213, Test Condition A
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Moisture Resistance	MIL-STD-202, Method 106, 10 cycles
Salt Spray	MIL-STD-202, Method 101, Test Condition B (48hrs)
Resistance to Soldering Heat	IEC 60127-4

Dimensions



Part Numbering System

0464 001. D R

SERIES

AMP Code*
Refer to Electrical Characteristics table

QUANTITY Code
D = 1500 pcs

PACKAGING Code
R = Tape and Reel

***Example:**
2.5 amp product is 0464**02.5** DR
(1 amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
24mm Tape and Reel	EIA RS-481-1 (IEC 286, part 3)	1500	DR

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Surface Mount Fuses

NANO²® > 250V UMF Time Lag Fuse > 465 Series

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465 Series Fuse

RoHS HF

Description

The Surface Mount Nano²® 250V UMF product family complies with IEC Publication IEC60127-4-Universal Modular Fuse-Links [UMF]. This IEC standard has been accepted world wide.

Features

- Listed to IEC 60127-4, Universal Modular Fuse-Links (UMF)
- 250VAC Voltage rating
- RoHS compliant and Halogen Free

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
PS E	NBK030205-E10480B	1A - 5A
PS E	NBK101105-E184655	6.3A
M	E184655	0.25A - 6.3A

Applications

- Power supply
- Lighting system
- White goods
- Industrial equipment

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
125%	1 hour, Minimum
200%	2 minutes, Maximum
1000%	0.01 sec., Min.; 0.1 sec., Max.

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals	
						PS E	M
1.00	001.	250	100A@250VAC	0.1070	2.5	x	x
1.25	1.25	250		0.0830	5.6	x	x
1.60	01.6	250		0.0560	9.0	x	x
2.00	002.	250		0.0390	14.4	x	x
2.50	02.5	250		0.0260	19.6	x	x
3.15	3.15	250		0.0210	32.4	x	x
4.00	004.	250		0.0160	48.4	x	x
5.00	005.	250		0.0130	90.0	x	x
6.30	06.3	250		0.0088	144.4	x	x

Notes:
- I²t calculated at 8ms.
- Resistance is measured at 10% of rated current, 25°C
- For information and availability of additional ratings please contact Littelfuse

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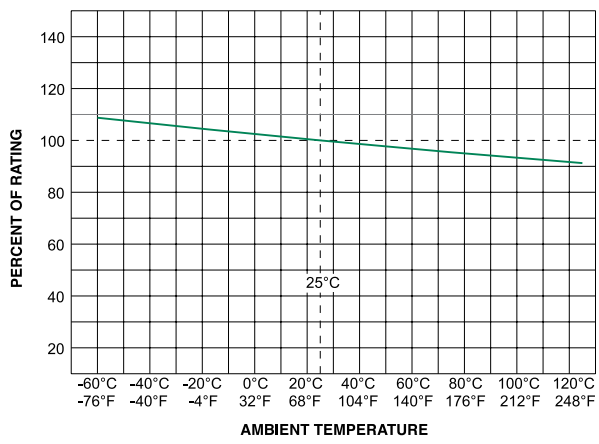
Revised: 03/03/17

Surface Mount Fuses

NANO2® > 250V UMF Time Lag Fuse > 465 Series

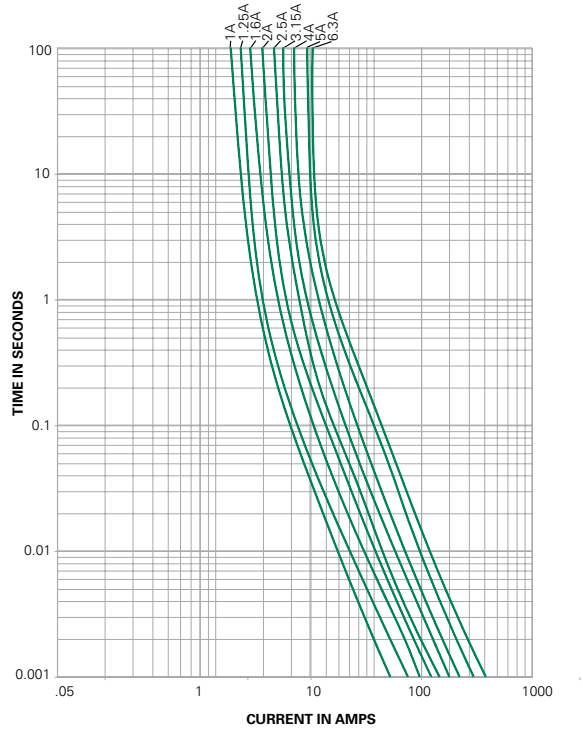
Temperature Re-rating Curve



Note:

1. Rerating depicted in this curve is in addition to the standard derating of 15% for continuous operation.

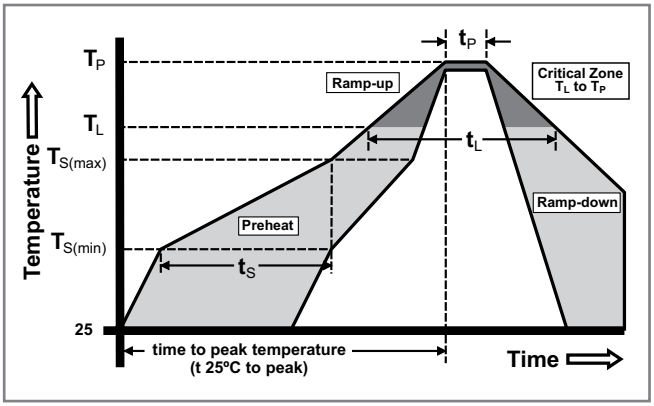
Average Time Current Curves



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)		$260^{+0/-5}$ °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, 3 seconds max.



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Surface Mount Fuses

NANO²® > 250V UMF Time Lag Fuse > 465 Series

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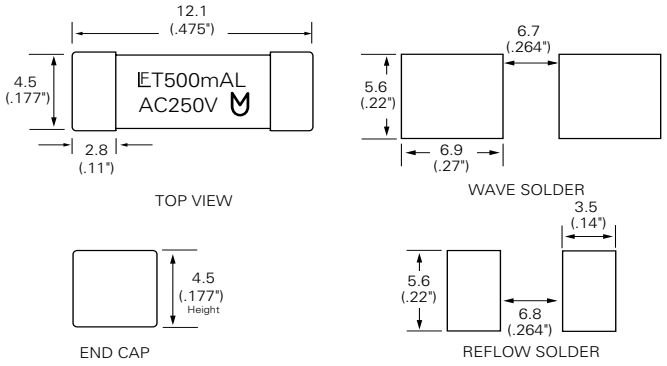
Expertise Applied | Answers Delivered

Product Characteristics

Materials	Body: High Performance Ceramic Terminations: Silver plated brass.
Product Marketing	Brand, Ampere Rating, Voltage Rating, UMF Logo
Operating Temperature	–55°C to 125°C.
Moisture Sensitivity Level	J-STD-020, Level 1
Solderability	IEC60127-4
Insulation Resistance (after opening	IEC 60127-4 (0.1Mohm min @ 500VDC)
Shock	MIL-STD-202, Method 213, Test Condition A

Thermal Shock	MIL-STD-202, Method 107, Test Condition B , 5 cycles, –65°C to 125°C
Mechanical Shock	MIL-STD-202, Method 213, Test Condition A
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Moisture Resistance	MIL-STD-202, Method 106, 10 cycles
Salt Spray	MIL-STD-202, Method 101, Test Condition B (48hrs)
Resistance to Soldering Heat	IEC 60127-4

Dimensions



Part Numbering System

0465 .500 D R

SERIES

AMP Code*
Refer to Electrical Characteristics table

QUANTITY Code
D = 1500 pcs

PACKAGING Code
R = Tape and Reel

***Example:**
2.5 amp product is 0465**02.5**DR
(0.5 amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
24mm Tape and Reel	EIA RS-481-1 (IEC 286, part 3)	1500	DR

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Surface Mount Fuses

NANO²® > 250V/350V VAC/VDC Time Lag Fuse > 462 Series

462 Series Fuse

Description

The 462 series Nano²® Surface Mount Fuse has time-lag current characteristics with interrupting ratings rated at 250V and 350V. It complies with IEC 60127-4 Universal Modular Fuse-Links.

Features

- Heat resistant plastic housing, UL 94 V-0
- Designed for line or low voltage applications
- Low voltage drop
- Internationally approved
- High pulse resistance
- Lead-free – compatible with lead-free solders and higher temperature profiles
- Available in ratings of 0.5A to 5A

Applications

- Lighting ballast
- AC/DC adaptor primary protection
- Transformerless AC/DC converter circuit
- High DC voltage power distribution system

Agency Approvals

AGENCY	AGENCY FILE NUMBERS	AMPERE RANGE
	E67006	0.5A - 5A
	40022235 40027839	1A,1.6A,3.15A, 4A 2A
	NBK250416-JP1021	1A - 1.6A
	JET1896-31007-1005	2A - 5A
	CQC14012115883	1.6A
	E242325	0.5A - 5A

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics for Series

% of Amp Rating	Opening Time
125%	1 hour, Minimum
200%	2 minutes, Maximum
1000%	10 milliseconds, Minimum 100 milliseconds, Maximum

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)[5]	Interrupting Rating	Nominal Cold Resistance (Ohms)[1]	Nominal Melting I²t (A²sec)	Nom Voltage Drop (mV)	Nom Power Dissipation (mW)	Agency Approvals[3]				
0.500	0500	250	100A @ 350VAC/VDC[4] 150A @ 250VAC/VDC	0.2270	0.43	160	200	X		X		
0.630	0630			0.1570	0.80	160	200	X		X		
0.800	0800			0.1300	1.40	160	250	X		X		
1.00	1100			0.0867	2.70	140	250	X	X	X		X
1.25	1125			0.0602	5.20	130	250	X		X		X
1.60	1160			0.0443	9.70	130	280	X	X	X	X	X
2.00	1200			0.0335	5.44	120	300	X	X	X		X
2.50	1250			0.0278	8.00	120	450	X		X		X
3.15	1315			0.0204	14.00	110	600	X	X	X		X
4.00	1400			0.0158	21.00	110	800	X	X	X		X
5.00	1500		150A @ 250VAC/VDC	0.0124	40.00	110	1000	X		X		X

1. Cold resistance measured at less than 10% of rated current at 23°C
2. I²t values slated for 8ms opening time
3. Agency Approval Table Key: X = Approved or Certified, P = Pending
4. UL Recognition - IR at 100A @ 350 VAC/VDC
5. Rated at 350VAC/VDC per UL Recognition under UL248 (up to 4A only). Rated at 250VAC/VDC per VDE under IEC standard 60127-4.

If you have special electrical characteristic needs, please contact Littelfuse to discuss application specific options.

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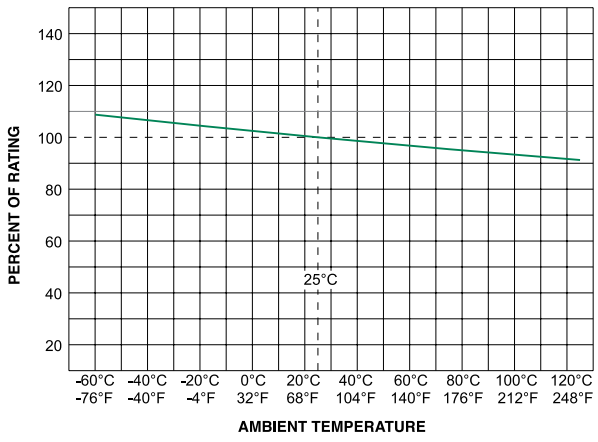
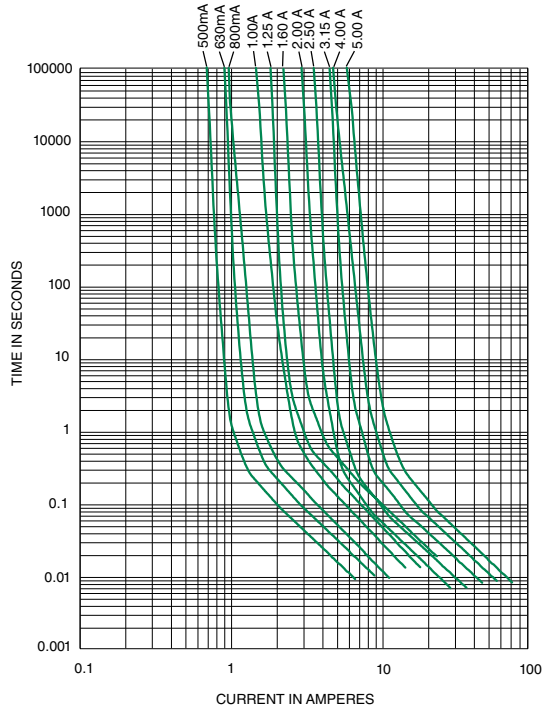
Temperature Re-rating Curve



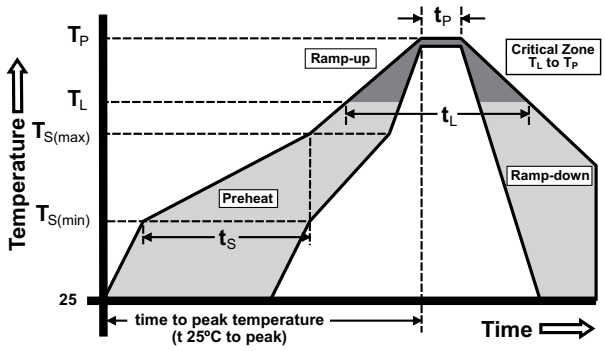
Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

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 seconds
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)		250$^{+0/-5}$ °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.



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Surface Mount Fuses

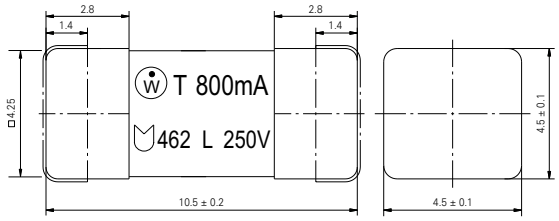
NANO²® > 250V/350V VAC/VDC Time Lag Fuse > 462 Series

Product Characteristics

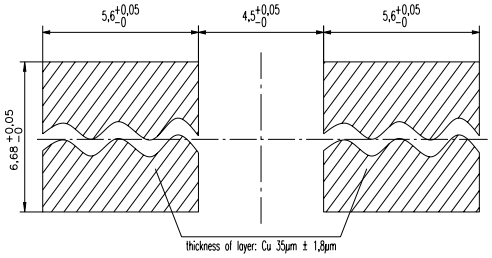
Materials	**Body:** Plastic UL 94 V-0 **Cap:** Tin-plated brass
Product Marking	**Body:** Brand Logo, "T" for Time-Lag, Current Rating, L Voltage Rating, UMF logo
Solderability	IEC 60068-2-58
Reistance to Soldering Heat	IEC 60068-2-58

Operating Temperature	–40°C to +85°C with proper derating
Climatic Category	IEC60068-1, -2-1, -2-2, -2-78 (–40°C to +85°C / 21 days)
Vibration	IEC60068-6 (24 cycles of 15 mins each, 1-60 Hz at 0.75mm amplitute, 60-2000 Hz at 10g acceleration)
Moisture Sensitivity Level	J-STD-020, Level 1

Dimensions



Recommended Pad Layout



Part Numbering System

462 0 500 0 0 0 0

SERIES

AMP CODE
0: < 1A
1: > 1A

AMP RATING
100: 1A
125: 1.25A
160: 1.6A
200: 2A
250: 2.5A
315: 3.15A
400: 4A
500: 500mA, 5A
630: 630mA
800: 800mA

KIND
0: Standard

VARIANT
0: Standard

PACKAGING CODE
0: Tape and Reel, 1500 pcs

RESERVE CHARACTER
0: Default

Examples:

0.5 amp (500mA) product is
462 **0 500** 0 0 0 0

5.0 amp product is
462 **1 500** 0 0 0 0

Please refer to Amp Code column of the Electrical Specifications table on the first page of this document.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
16mm Tape and Reel	IEC 60286, part 3	1500	0

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Surface Mount Fuses

Nano²® > 600VDC > Fast-Acting Fuse > 485 Series

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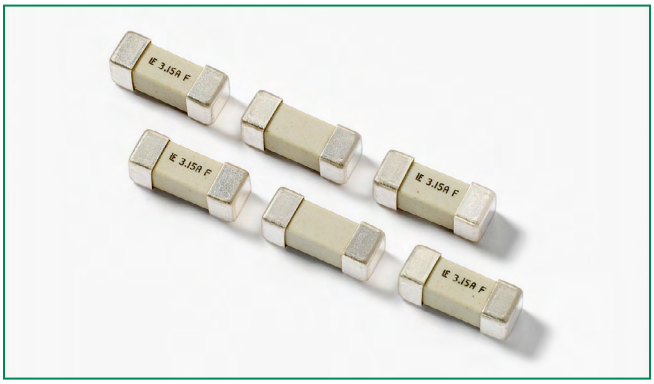
485 Series Fuse



Description

The 485 Nano²® Fuse Series is a small, fast-acting, surface mount ceramic fuse rated at a remarkable 600VDC at its small size and with 100A breaking capacity. It is primarily designed for circuit protection in high energy applications. This product is fully compatible with lead-free solder alloys and higher temperature profiles associated with lead-free assembly.

Features

- Fast-Acting / Surface mount high fuse for high voltage (up to 600VDC) applications.
- Fully compatible with lead-free solder alloys and higher temperature profiles associated with lead-free assembly.
- Relatively high breaking capacity at 100A.
- RoHS compliant / Halogen Free
- Rating – 1 - 3.15 Amperes.

Applications

- PC server and Telecom systems
- LCD TV inverter boards DC input protection
- Uninterruptible Power Supply (UPS) / 3-Phase Power Supplies
- 380VDC server / lighting in data center

Additional Information

Datasheet | **Resources** | **Samples**

Agency Approvals

Agency	Agency File Number	Ampere Rating
	E10480	1A - 3.15A
	29862	1A - 3.15A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time at 25°C
100%	4 hours, Minimum
200%	60 seconds, Maximum

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals	
1.00	001.	600	100A@600VDC, 100A@250VAC	0.264	0.3044	X	X
1.50	01.5	600		0.123	0.3917	X	X
2.00	002.	600		0.0744	0.8962	X	X
2.50	02.5	600		0.0583	1.4921	X	X
3.15	3.15	600		0.0395	3.304	X	X

Notes:

1. Cold resistance measured at less than 10% of rated current at 23°C.
2. Agency Approval Table Key: X=Approved or Certified, P=Pending and Blank=Not Approved.
3. I²t values stated for 8 msec opening time.

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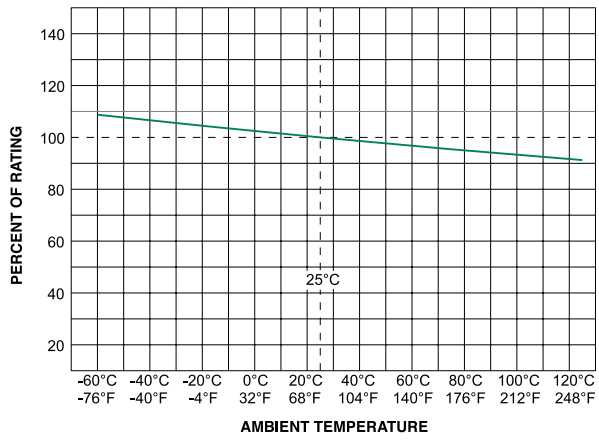
Surface Mount Fuses

Nano²® > 600VDC > Fast-Acting Fuse > 485 Series

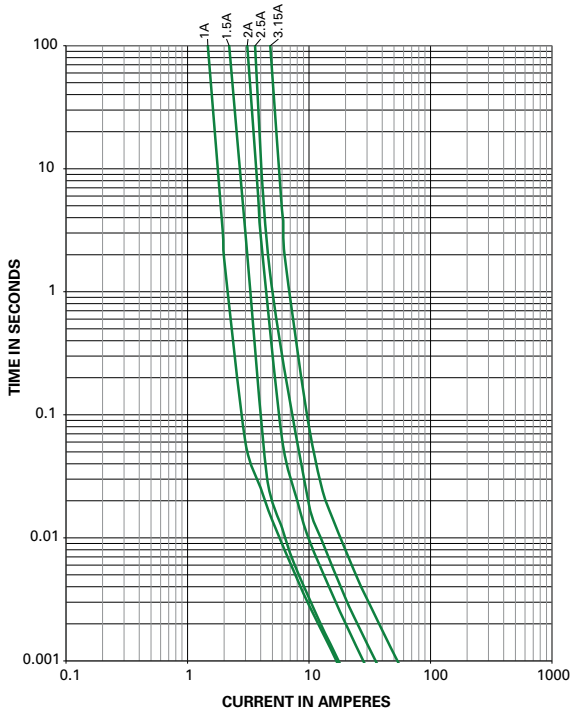
Temperature Re-rating Curve



Note:

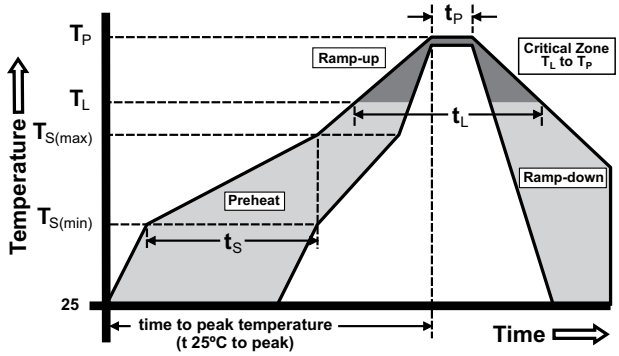
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Reflow Soldering

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 – 180 ses
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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °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



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Surface Mount Fuses

Nano²® > 600VDC > Fast-Acting Fuse > 485 Series

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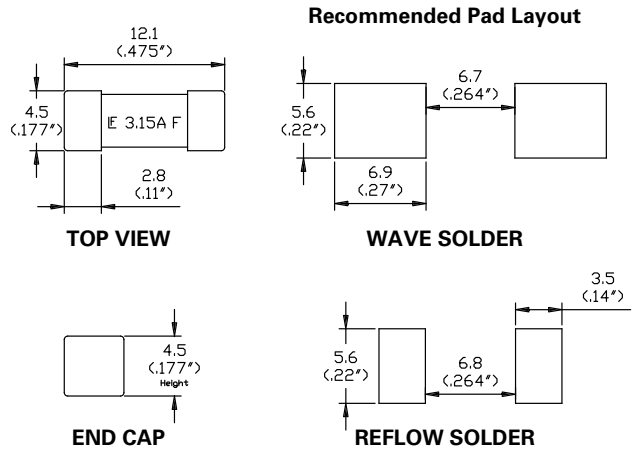
Product Characteristics

Material	**Body:** Ceramic **Cap:** Silver Plated Brass
Product Marking	**Body:** Brand Logo, Current Rating
Operating Temperature	-55˚C to 125˚C with proper derating
Moisture Sensitivity Level	Level 1 J-STD-020
Solderability	MIL-STD-202, Method 208
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms, Minimum)

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

Dimensions



Part Numbering System

0485 3.15 D R

SERIES

AMP Code*
Refer to Electrical Characteristics Table

QUANTITY Code
D = 1500 pieces

PACKAGING Code
R = Tape and Reel

***Example**
3.15 amp is 04853.15DR

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Option Code
24mm Tape and Reel	EIA-RS 481-1, (IEC 286, Part 3	1500	DR

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461 Series TeleLink® Fuse

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	.5A - 2A
	29862	.5A - 2A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
250%	1 sec., Min.; 120 secs., Max.

Maximum Temperature Rise

Telecom Nano²® Fuse	Temperature Reading
04611.25	< 82°C (180°F)
0461002.	< 50°C (122°F)

Higher Currents and PCB layout designs can affect this parameter.
Readings are measured at rated current after temperature stabilizes.

Additional Information

Datasheet | **Resources** | **Samples**

Description

The Littelfuse 461 Series TeleLink® Surface Mount, Surge Resistant Fuse, offers over-current protection for a wide range of telecom applications without requiring a series resistor. When used in conjunction with a Littelfuse SIDACtor® Transient Voltage Suppressor (TVS) or a Greentube™ Gas Plasma Arrestor, this combination provides a compliant solution for standards and recommendations such as GR-1089–Core, TIA-968-A, UL/EN/IEC 60950, and ITU K.20 and K.21. The coordination requirement contained in GR-1089–Core, and ITU K.20/21 may require a series of impedance devices.

Features

- Surface mount surge resistant Slo-Blo® fuse
- Meet UL 60950 3rd Edition power cross requirements standard alone
- Designed to allow compliance with Telcordia GR-1089-CORE and TIA-968-A (formerly FCC Part 68) Surge Specifications
- Provide coordinated protection with Littelfuse SIDACtor® Transient Voltage Suppressor (TVS)or a Greentube™ Gas Plasma Arrestor, without series resistors
- Designed to serve the requirements of a wide range of telecommunication and networking equipment
- 2A rating has improved temperature rise performance under 2.2A surge current testing when compared with 1.25A rating
- Product is Halogen Free and RoHS compliant and compatible with lead-free solder and higher temperature profiles when ordered with Standard Silver Plated Brass Caps
- Standard product is RoHS Compliant and compatible with lead-free solders and higher temperature profiles

Applications

- T1/E1/J1 and HDSL2/4
- SLIC interface portion of Fiber to the Curb (FTTC) and Fiber to the Premises (FTTP)
- Non-Fiber SLIC interface for Central Office (CO) locations and Remote Terminals (RT)
- xDSL applications such as ADSL, ADSL2+, VDSL, and VDSL2+
- Ethernet 10/100/1000BaseT
- POTS applications such as modems, answering machines, telephones, fax machines, and security systems
- ISDN "U" interface
- Baystation T1/E1/J1, T3 (DS3) trunk cards

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Revised: 03/03/17

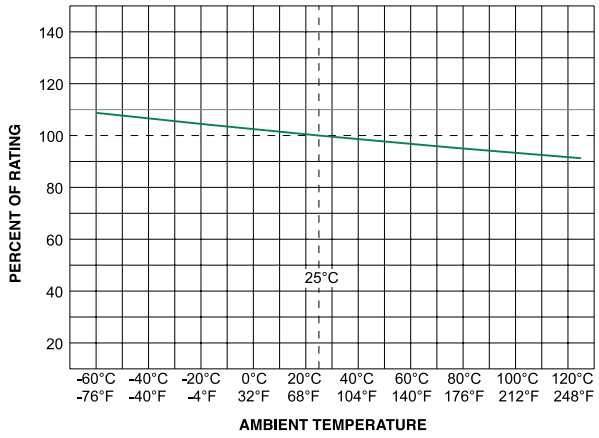
Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals	
						UL	CSA
0.500	.500	600	50A @ 250 VAC 60 A @600 VAC 100 A @80 VDC	0.560	0.840[1]	x	x
1.25	1.25	600		.1040	16.5[1]	x	x
2.00	002.	600		.0450	17.5[1]	x	x

[1] I²t is calculated at 10 msecs. or less. I²t at 10 times rated current has a typical value of: 24 A²sec (2.0A), 22 A²sec (1.25A), 1.3 A²sec (0.5A).

- Typical inductance <40nH up to 500 MHz.
- Resistance changes 0.5% for every °C.
- Resistance is measured at 10% rated current.

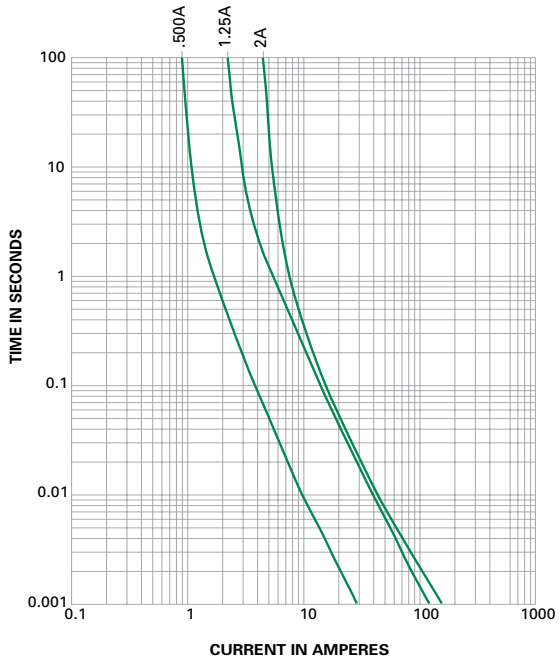
Temperature Re-rating Curve



Note:

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

Average Time Current Curves



GR 1089 Inter-building requirements

GR 1089 1st level lighting surge inter-building (Equipment under test can not be damaged and must continue to operate properly)

Surge	Minimum Peak Voltage (V)	Minimum Peak Current (A)	Max. Rise/Min. Decay (µs)	Repetitions Each Polarity	Fuse Choices
1	600	100	10/1000	25	1.25, 2.0
2	1000	100	10/360	25	1.25, 2.0
3	1000	100	10/1000	25	1.25, 2.0
4	2500	500	2/10	10	1.25, 2.0
5	1000	25	10/360	5	0.5, 1.25, 2.0

If sufficient series resistance is used, then the 0.5 fuse may be used in test conditions 1-4.

GR 1089 2nd level lightning surge telecom port (Equipment under test shall not become a fire or electrical safety hazard)

Surge	Minimum Peak Voltage (V)	Minimum Peak Current (A)	Max. Rise/Min. Decay (µs)	Repe-titions Each Polarity	Fuse Choices
1	5000	500	2/10	1	0.5, 1.25, 2.0
Alter-native	5000	500/8=625	8/10	1	0.5, 1.25, 2.0

The 0.5 fuse will open during these test conditions. The 1.25 & 2.0 will not open thus providing operational compliance.

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Revised: 03/03/17

Surface Mount Fuses

Surge Resistant > 461 Series TeleLink® Fuse

GR 1089 AC power fault 1st level inter-building (fuse not allowed to open)

Test	Vrms	Short Circuit Current (A)	Hits	Duration	Primary Protector	Fuse Choices
1	50	0.33	1	15 min.	removed	1.25, 2.0
2	100	0.17	1	15 min.	removed	1.25, 2.0
3	200,400, 600	1	60	1 sec.	removed	1.25, 2.0
4	1000	1	60	1 sec.	operative	1.25, 2.0
5	Diagram	Diagram	60	5 secs.	removed	1.25, 2.0
6	600	0.5	1	30 secs.	removed	1.25, 2.0
7	440	2.2	5	2 secs.	removed	1.25, 2.0
8	600	3	1	1.1 secs.	removed	1.25, 2.0
9	1000	5	1	0.4 sec.	in place	1.25, 2.0

GR 1089 AC power fault 2nd level (fuse can open but must open in a safe and controlled manner)

Test Circuit	Vrms	Short Circuit Current (A)	Duration	Fuse
1	120,277	25	15 min.	0.5, 1.25, 2.0
2	600	60	5 secs.	0.5, 1.25, 2.0
3	600	7	5 secs.	0.5, 1.25, 2.0
4	100-600	2.2	15 min..	0.5, 1.25, 2.0
5	Diagram	Diagram	15 min.	0.5, 1.25, 2.0

Fuse must open before wiring simulator fuse (MDL 2.0).

TIA –968-A (formerly FCC Part 68) Surge Waveforms (fuse can not open during type B events)

Surge	Voltage (V)	Waveform (µs)	Current (A)	Repetitions	Recommended Fuse
Metallic A	800	10×560	100	1 ea. polarity	1.25
Longitudinal A	1500	10×160	200	1 ea. polarity	1.25
Metallic B	1000	9×720	25	1 ea. polarity	1.25
Longitudinal B	1500	9×720	37.5	1 ea. polarity	1.25

For the type A events the 0.5 fuse will open, providing non-operational compliance. The 1.25 & 2.0 will not open, providing for operational compliance with TIA-968-A type A surge events.

UL 60950 requirements

UL60950 (EN 60950) (formerly UL 1950) Power Cross (L = longitudinal, M = metallic)

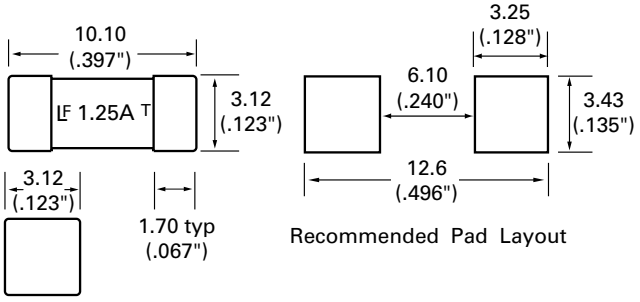
Test Number	Voltage (V)	Current (A)	Time	Fuse Choices
L1	600	40	1.5 secs.	0.5, 1.25, 2.0
L2	600	7	5 secs.	0.5, 1.25, 2.0
L3	600	2.2	30 min.	0.5, 1.25, 2.0
L4	200	2.2	30 min.	0.5, 1.25, 2.0
L5	120	25	30 min.	0.5, 1.25, 2.0
M1	600	40	1.5 secs.	0.5, 1.25, 2.0
M2	600	7	5 secs.	0.5, 1.25, 2.0
M3	600	2.2	30 min.	0.5, 1.25, 2.0
M4	600	2.2	30 min.	0.5, 1.25, 2.0

Selection of test number depends on current limiting F fire enclosure/spacing of end product

- 26 AWG line cord removes L1/M1 test requirement
- L5 conducted only if product does not pass section 6.1.2
- L2,M2,L3,M3,L4,M4 conducted if not in a fire enclosure

Fuse must open before the wiring simulator fuse (MDL 2.0).

Dimensions



UL60950 (EN 60950) (formerly UL 1950) Impulse Test and Steady-State Electric Strength Test

Test	Voltage (V)	Current (A)	Waveform	Repetitions	Fuse Choices
Impulse					
For handheld units	2500	62.5	10×700ms	+/- 10 w/60 secs. rest	0.5, 1.25, 2.0
Non handheld	1500	37.5	10×700ms	+/- 10 w/60 secs. rest	0.5, 1.25, 2.0
Steady-State					
For handheld units	1500		60Hz		0.5, 1.25, 2.0
Non handheld	1000		60Hz		0.5, 1.25, 2.0

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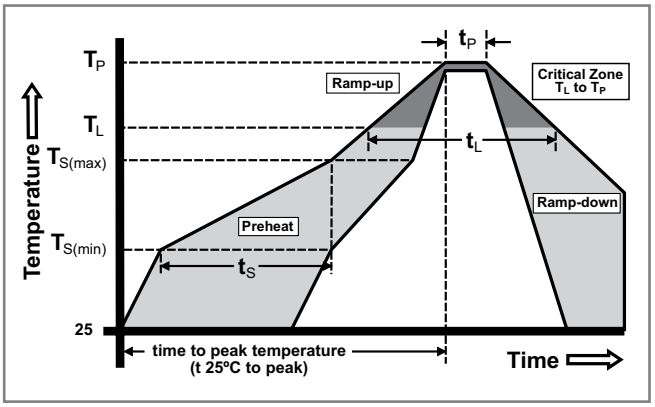
Soldering Parameters

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 seconds
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)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C



Product Characteristics

Materials	**Body:** Ceramic **Terminations:** Silver-plated Caps
Product Marking	Brand Logo, Ampere Rating, T
Operating Temperature	-55°C to 125°C
Moisture Sensitivity Level	Level 1, J-STD-020
Solderability	IEC-60127-4 (215°C immersion, 3 seconds)
Resistance to Dissolution of Metallization	IPC / EIA J-STD-002-Test D 260°C for 120 seconds
Thermal Shock	MIL-STD-202, Method 107, Test Condition B, -55°C to +125°C, 30 minutes @ each extreme
Mechanical Shock	MIL-STD-202, Method 213, Test Condition A - Half Sine, 50 G's, 11 msecs. duration
High Frequency Vibration	MIL-STD-202, Method 204, Test Condition D
Moisture Resistance	MIL-STD-202, Method 106, 50 cycles
Terminal Strength	Board deflection per EIA / IS-722, 1mm deflection for 1 minute
Terminal Attachment	MIL-STD-202, Method 211, Test Condition A, 5 lbs applied to end caps

Part Numbering System

0461 1.25 E R

SERIES

AMP Code*
Refer to Electrical Characteristics table

QUANTITY Code
E = 2500 pcs

PACKAGING Code
R = Tape and Reel

***Example:**
2 amp product is 0461**002.**ER
(1.25 amp product shown above)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
24mm Tape and Reel	EIA RS-481-2 (IEC 286, part 3)	2500	ER

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Surface Mount Fuses

NANO²® > 154 OMNI-BLOK® Fuse and Holder Combination

154/154T/154L/154TL Series OMNI-BLOK® Fuse and Holder Assembly

154/154T (Tan color base like shown in this image)
154L/154TL (Black color base)

Description

The RoHS compliant 154 Series OMNI-BLOK® Fuse and Holder Assembly offers a solution for efficient installation and easy replacement of miniature Nano²® surface mount fuses. Offered in a tape and reel package, this fuse and holder combination can be installed on a PC board as an efficient single step. Fuse replacement can be accomplished without exposing the PC board to the detrimental effects of solder heat.

The fuse holder unit may be sold as a stand-alone item, shipped in bulk quantity (not pre-packaged in tape and reel cartridges) using part number 155900. Please contact Littelfuse for additional information.

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E14721	154 Fast-Acting Fuse: 0.062A - 10A 154 Slo-Blo® Fuse: 0.375A - 7A
PS E	NBK030205-E10480A	154 Fast-Acting Fuse: 1A - 1.6A
	NBK030205-E10480B	154 Fast-Acting Fuse: 2A - 5A
	NBK101105-E184655	154 Fast-Acting Fuse: 6.3A - 10A
	NBK030205-E10480B	154 Slo-Blo® Fuse: 1A - 5A

Features

- Easy fuse replacement
- Miniature size
- RoHS compliant and Halogen Free
- Very Fast-Acting and Time-Lag options available
- Holder sized to fit a range of Nano²® type fuses
- Low fuse temperature re-rating
- Wide range of current rating available
  - Fast-Acting Fuses: 62mA - 10A
  - Slo-Blo Fuses: 375mA - 5A
- Wide operating temperature range
- Heat-resistant fuseholder, UL94 V-0
- 260°C reflow capable fuseholder

Ordering Information

With Very Fast-Acting Fuse Installed

Catalog Number	Ampere Rating (A)	Amp Code	Fuse Furnished*
0154.062	0.062	.062	0453.062
0154.080	0.08	.080	0453.080
0154.100	0.1	.100	0453.100
0154.125	0.125	.125	0453.125
0154.160	0.16	.160	0453.160
0154.200	0.2	.200	0453.200
0154.250	0.25	.250	0453.250
0154.315	0.315	.315	0453.315
0154.375	0.375	.375	0453.375
0154.400	0.4	.400	0453.400
0154.500	0.5	.500	0453.500
0154.630	0.63	.630	0453.630
0154.750	0.75	.750	0453.750
0154.800	0.8	.800	0453.800
0154001.	1	001.	0453001.
01541.25	1.25	1.25	04531.25
015401.5	1.5	01.5	045301.5
015401.6	1.6	01.6	045301.6
0154002.	2	002.	0453002.
015402.5	2.5	02.5	045302.5
0154003.	3	003.	0453003.
01543.15	3.15	3.15	04533.15
015403.5	3.5	03.5	045303.5
0154004.	4	004.	0453004.
0154005.	5	005.	0453005.
015406.3	6.3	06.3	045306.3
0154007.	7	007.	0453007.
0154008.	8	008.	0453008.
0154010.	10	010.	0453010.

With Slo-Blo® Fuse Installed

Catalog Number	Ampere Rating (A)	Amp Code	Fuse Furnished*
154.375 T	0.375	.375	0454.375
154.500 T	0.5	.500	0454.500
154.750 T	0.75	.750	0454.750
154001. T	1	001.	0454001.
15401.5 T	1.5	01.5	045401.5
154002. T	2	002.	0454002.
15402.5 T	2.5	02.5	045402.5
154003. T	3	003.	0454003.
15403.5 T	3.5	03.5	045403.5
154004. T	4	004.	0454004.
154005. T	5	005.	0454005.
154007. T	7	007.	0454007.

* The 453 and 454 Series fuses identified above have silver-plated end caps, designed to accommodate solder reflow processes:

For 453 Series fuse replacement, either 451, 453 or 448 Series may be used.

For 454 Series fuse replacement, either 452, 454 or 449 Series may be used.

For detailed operating characteristic and performance information for each of the fuse series mentioned above, please refer to their respective data available online at www.littelfuse.com.

** 155900 is UR recognized and rated 125V, 10A.

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Surface Mount Fuses

NANO2® > 154 OMNI-BLOK® Fuse and Holder Combination

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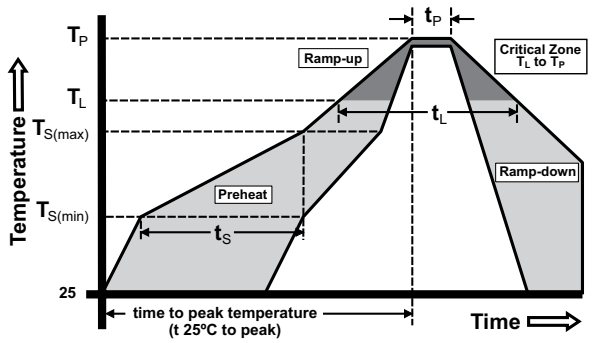
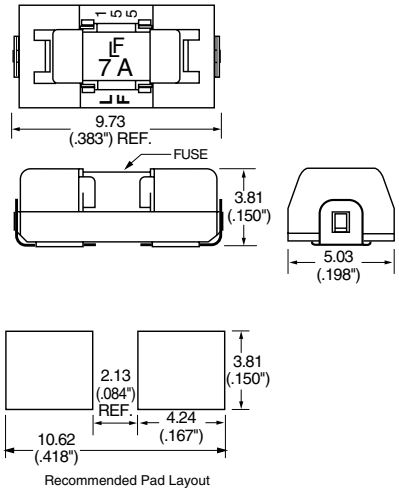
Soldering Parameters

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 seconds
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$^{+0/-5}$ °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



Dimensions



Product Characteristics

Operating Temperature	-55°C to 125°C

Part Numbering System

0154 001. D R T L

SERIES

AMP Code
Refer to Ordering information section on previous page.

QUANTITY Code
D = 1500 pcs

PACKAGING Code
R = Tape and Reel

TYPE Code
T = Time-Lag (Slo-Blo®)

"L" suffix for Black Color Holder
"G" suffix for 451L and 452L Fuses (Au-Plated Caps)

Example:
1.5 amp Fast-acting product is 0154**01.5**DR.
1.5 amp Time-lag product is 0154**01.5**DRT.
(1 amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Reel Pack	EIA RS–481–2 (IEC 286, part 3)	1500	DR

Additional Information

Datasheet | **Resources** | **Samples**

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Revised: 03/03/17

157 Series – Standard Nano²® Fuse and Clip Assembly

RoHS HF c UL us PS E

Description

The 157 Series – Standard Nano Fuse/Clip assembly is a small, square, very fast-acting surface mount fuse that is assembled in surface mountable fuse clips. The fuse clip and pre-installed fuse combination can be automatically placed in PC Board in one efficient manufacturing operation. It permits quick and easy replacement of fuses without performing desoldering process, even in the field and without exposing the PC Board to detrimental effects of rework solder heat.

Features

- Surface Mountable, Very Fast-Acting Fuse.
- Fully compatible with RoHS/Pb-Free solder alloys and higher temperature profiles associated with leadfree assembly.
- Easily replaceable on PC Board (Field Replaceable)
- RoHS compliant and Halogen Free
- Available in ratings of 0.062 ~ 10 Amperes.

Applications

- Instrumentation
- Base Stations
- Telecommunications

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
c UL us	E14721	0.062A ~ 10A
PS E	NBK030205-E10480A NBK030205-E10480B NBK101105-E184655	1A - 1.6A 2A - 5A 6.3A - 10A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time at 25°C
100%	4 hours Minimum
200%	5 secs. Maximum

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating (A)	Fuse Furnished	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals	
							c UL us	PS E
0.062	.062	125	50A @ 125 VAC/VDC 300A @ 32 VDC	0451.062	5.5372	0.00019	X	
0.080	.080	125		0451.080	4.0500	0.00033	X	
0.100	.100	125		0451.100	3.1000	0.00138	X	
0.125	.125	125		0451.125	1.7059	0.00286	X	
0.160	.160	125		0453.160	1.2157	0.0048	X	
0.200	.200	125		0453.200	1.3971	0.00652	X	
0.250	.250	125		0453.250	1.0496	0.01126	X	
0.315	.315	125		0453.315	0.3881	0.0311	X	
0.375	.375	125		0453.375	0.6100	0.0442	X	
0.400	.400	125		0453.400	0.5600	0.0551	X	
0.500	.500	125		0453.500	0.4200	0.0824	X	
0.630	.630	125		0453.630	0.3050	0.1381	X	
0.750	.750	125		0453.750	0.2450	0.2143	X	
0.800	.800	125		0453.800	0.2120	0.2654	X	
1.0	001.	125		0453001.	0.1530	0.6029	X	X
1.25	1.25	125		04531.25	0.078	0.664	X	X
1.5	01.5	125		045301.5	0.0634	0.853	X	X
1.6	01.6	125		045301.6	0.0580	1.060	X	X
2.0	002.	125		0453002.	0.0373	0.530	X	X
2.5	02.5	125		045302.5	0.0288	1.029	X	X
3.0	003.	125		0453003.	0.0229	1.650	X	X
3.15	3.15	125		04533.15	0.0215	1.920	X	X
3.5	03.5	125		045303.5	0.0203	2.469	X	X
4.0	004.	125		0453004.	0.0163	3.152	X	X
5.0	005.	125		0453005.	0.0127	5.566	X	X
6.3	06.3	125		045306.3	0.0098	9.17	X	X
7.0	007.	125		0453007.	0.0092	10.32	X	X
8.0	008.	125		0453008.	0.0079	20.23	X	X
10.0	010.	125	35A @ 125 VAC / 50A @125 VDC 300A @ 32VDC	0453010.	0.0058	26.46	X	X

1. Cold resistance measured at less than 10% of rated current at 23°C.
2. I²t values stated for 8ms opening time.
3. Agency Approval Table Key: X=Approved or Certified, P=Pending and Blank=Not Approved
4. Have special electrical characteristic needs? Contact Littelfuse to learn more about application specific options.

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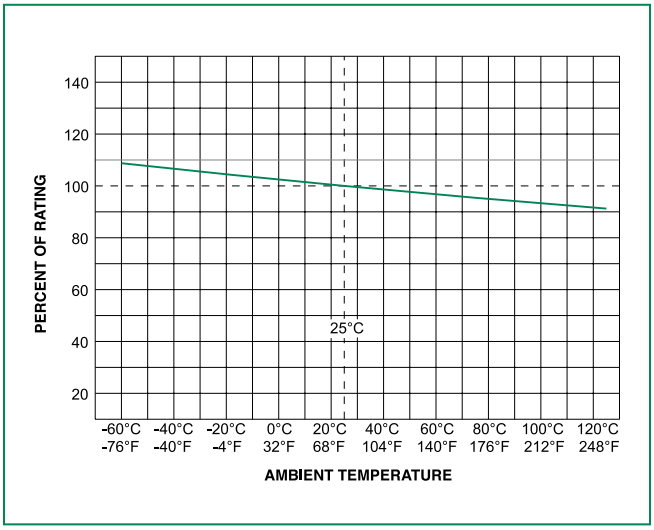
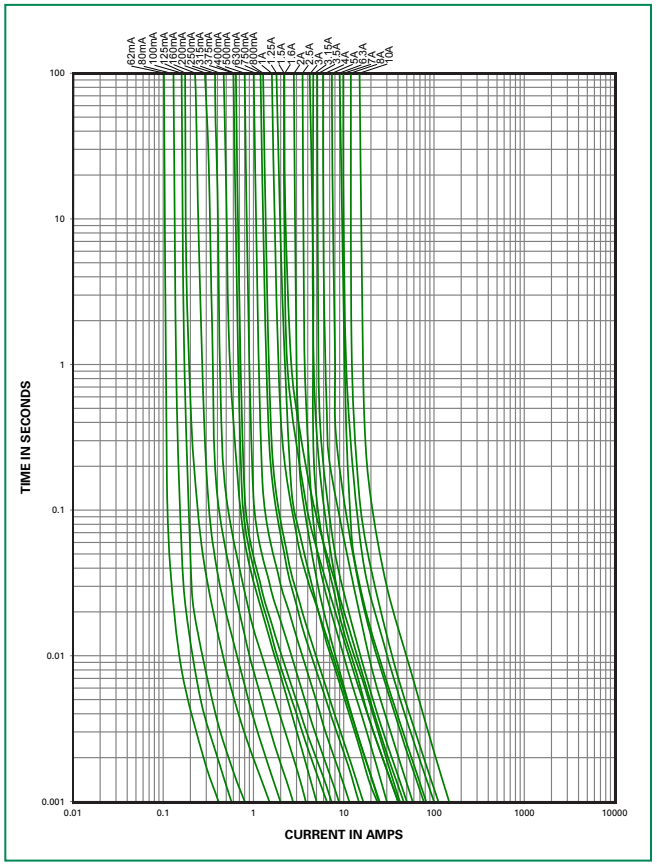
Temperature Re-rating Curve



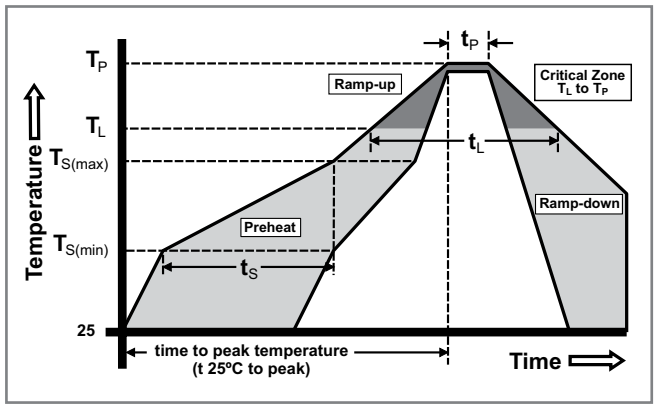
Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

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)		$260^{+0/-5}$ °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



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Surface Mount Fuses

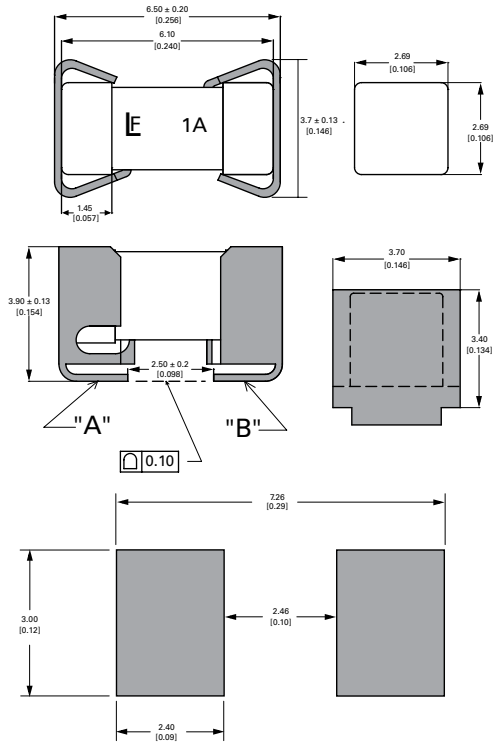
NANO²® > 157 Fuse and Holder Combination

Product Characteristics

Materials	**Body:** Ceramic **Cap:** For 0.062A ~ 0.125A – Au plated Brass For 0.200A ~ 10A – Silver plated Brass **Clip Plating:** Matte Tin
Product Marking	**Body:** Brand Logo, Current Rating
Clip Retention	Force applied at fuse center, perpendicular to the long axis (@ 0.75 lbs. MIN)
Solderability	MIL-STD-202, Method 208 / IPC/ EIA / JEDEC J-STD-002, Test Condition A
Humidity Test	MIL –STD-202, Method 103 @ 85°C / 85%RH, 1000 hours
Resistance to Solvents	MIL-STD-202, Method 215 (3 solvent types)

Operating Temperature	-55°C to 125°C with proper derating
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Moisture Resistance	MIL-STD-202, Method 106, 10 cycles
Salt Spray/ Atmosphere	MIL-STD-202, Method 101, Test Condition B (48 hrs.), 5% NaCl in De-ionized Water
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)

Dimensions



PCB Recommendation for Thermal Management

1. Minimum Copper Layer Thickness = 100um
2. Minimum Copper Trace Width = 10mm

Note:

Alternate methods of thermal management may be used. In such cases, under normal operations, the maximum temperature of the fuse body should not exceed 80°C in a 25°C ambient environment.

Part Numbering System

0157 001. D R

- **SERIES**
- **AMP CODE**
- **QUANTITY CODE** — D = 1500 pcs
- **PACKING OPTION** — R = Tape and Reel

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Tape and Reel	Surface Mount	1500	DR

Additional Information

Datasheet | **Resources** | **Samples**

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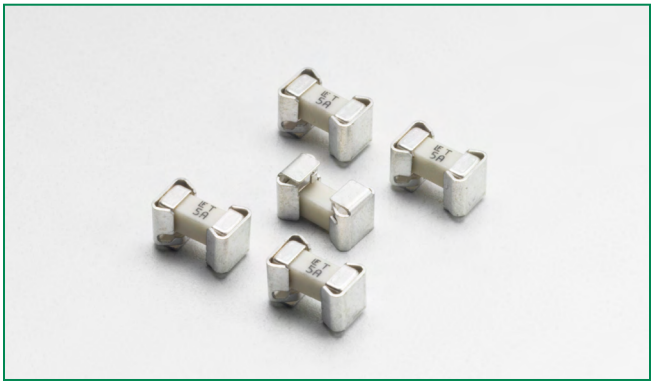
Surface Mount Fuses

NANO²® > 157T Fuse and Holder Combination

Littelfuse
Expertise Applied | Answers Delivered

157T Series – Standard Nano²® Fuse and Clip Assembly



Description

The 157T Series Fuse/Clip assembly is a small, square, Time-Lag, surface mount fuse that is assembled in surface mountable fuse clips. The unique time delay feature of this fuse design helps solve the problem of nuisance "opening" by accommodating inrush currents that normally cause a fast-acting fuse to open.

The fuse clip and pre-installed fuse combination can be automatically placed in PC Board in one efficient manufacturing operation. It permits quick and easy replacement of fuses without performing desoldering process, even in the field and without exposing the PC Board to detrimental effects of rework solder heat.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
c UL us	E14721	0.375A ~ 5A
PS E	NBK030205-E10480B	1A - 5A

Features

- Surface Mountable, Time-Lag Fuse.
- Fully compatible with RoHS/Pb-Free solder alloys and higher temperature profiles associated with leadfree assembly.
- Easily replaceable on PC Board (Field Replaceable)
- RoHS Compliant and Halogen-free
- Available in ratings of 0.375 ~ 5 Amperes.

Electrical Characteristics for Series

% of Ampere Rating	% of Ampere Rating	Opening Time at 25°C
100%	0.375A ~ 5A	4 hours, Minimum
200%	0.375A ~ 5A	1 sec. Minimum, 60 secs. Maximum
300%	0.375A ~ 5A	0.20 secs. Minimum, 3.00 secs. Maximum
800%	0.375A ~ 5A	0.02 secs. Minimum, 0.10 secs. Maximum

Applications

- Instrumentations
- Base Stations
- Telecommunications

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating (A)	Fuse Furnished	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals	
							c UL us	PS E
0.375	.375	125	50A @ 125VAC/VDC	0454.375	1.2214	0.101	X	
0.500	.500	125		0454.500	0.7047	0.240	X	
0.750	.750	125		0454.750	0.3602	0.904	X	
1.00	001	125		0454001.	0.2245	1.98	X	X
1.50	01.5	125		045401.5	0.0934	3.65	X	X
2.00	002	125		0454002.	0.0629	8.20	X	X
2.50	02.5	125		045402.5	0.0452	15.0	X	X
3.00	003	125		0454003.	0.0342	20.16	X	X
3.50	03.5	125		045403.5	0.0226	26.53	X	X
4.00	004	125		0454004.	0.0188	34.40	X	X
5.00	005	125		0454005.	0.0138	53.72	X	X

1. Cold resistance measured at less than 10% of rated current at 23°C.
2. I^2t values stated for 8ms opening time.
3. Agency Approval Table Key: X=Approved or Certified, P=Pending and Blank=Not Approved
4. Have special electrical characteristic needs? Contact Littelfuse to learn more about application specific options

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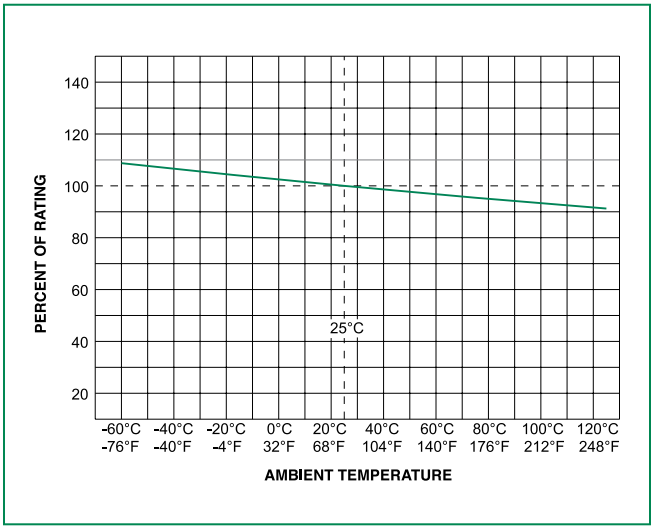
Surface Mount Fuses

NANO²® > 157T Fuse and Holder Combination

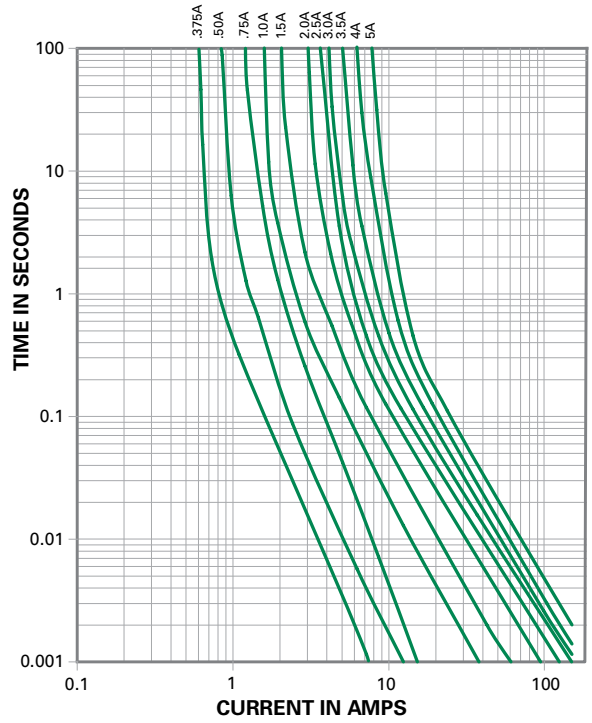
Temperature Re-rating Curve



Note:

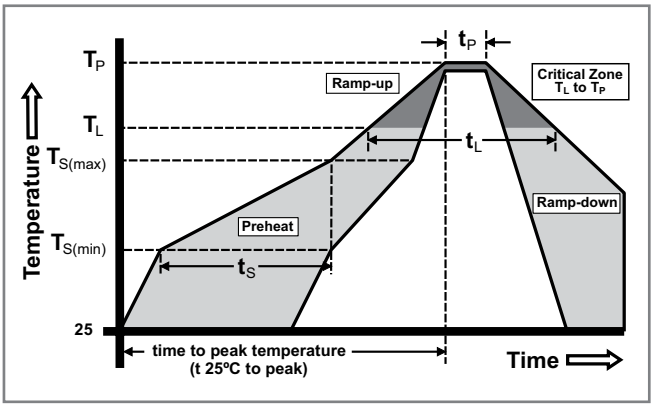
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

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)		$250^{+0/-5}$ °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



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Surface Mount Fuses

NANO²® > 157T Fuse and Holder Combination

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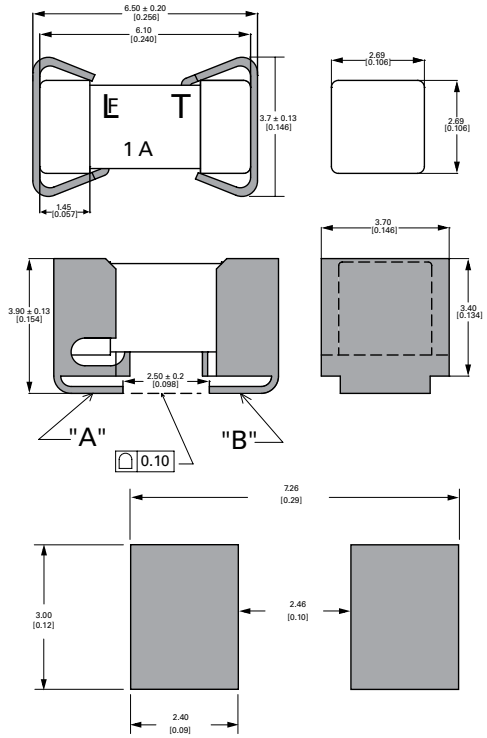
Product Characteristics

Materials	**Body:** Ceramic **Cap:** For 0.375A ~ 5A – Silver plated Brass **Clip Plating:** Matte Tin
Product Marking	**Body:** Brand Logo, Current Rating, "T" for Time-Lag
Clip Retention	Force applied at fuse center, perpendicular to the long axis (@0.75 lbs. MIN)
Solderability	MIL-STD-202, Method 208 / IPC/ EIA / JEDEC J-STD-002, Test Condition A
Humidity Test	MIL –STD-202, Method 103 @ 85°C / 85%RH, 1000 hours
Resistance to Solvents	MIL-STD-202, Method 215 (3 solvent types)

Operating Temperature	-55°C to 125°C with proper derating
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Moisture Resistance	MIL-STD-202, Method 106, 10 cycles
Salt Spray/ Atmosphere	MIL-STD-202, Method 101, Test Condition B (48 hrs.), 5% NaCl in De-ionized Water
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)

Dimensions



PCB Recommendation for Thermal Management

1. Minimum Copper Layer Thickness = 100um
2. Minimum Copper Trace Width = 10mm

Note:
Alternate methods of thermal management may be used. In such cases, under normal operations, the maximum temperature of the fuse body should not exceed 80°C in a 25°C ambient environment.

Part Numbering System

0157 005. D R T

- **SERIES**
- **AMP CODE**
- **TIME-LAG FUSE**
- **PACKING OPTION**
  R = Tape and Reel
- **QUANTITY CODE**
  D = 1500 pcs

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Tape and Reel	Surface Mount	1500	DRT

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159 Series Telelink® Fuse and Clip Assembly

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
c UL us	E14721	0.5A, 1.25A, 2.0A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
250%	1 sec., Minimum 120 secs., Maximum

Additional Information

Datasheet | Resources | Samples

Description

The 159 Series product is a metal fuse clip with pre-installed Littelfuse 461 Series TeleLink® fuse. This fuse and clip combination can be automatically installed in PC Boards in one efficient manufacturing operation. It permits quick and easy fuse replacement without exposing the PC Board and other components to risks of rework solder heat as required with direct surface mount fuses.

It meets UL 60950 power cross requirements and is designed to allow compliance with Telcordia GR-1089-CORE and TIA-968-A Surge Specifications. The product provides coordinated protection with Littelfuse SIDACtor® protection thyristors without series resistors.

Features

- Offer low profile easily-replaceable fuse alternative compatible with automated PCB surface mount equipment
- Come supplied with surge resistant Littelfuse 461 series TeleLink® Slo-Blo® fuse
- Fuse designed to allow compliance with Telcordia GR-1089-CORE and TIA-968-A (formerly FCC Part 68) Surge Specifications
- Provide coordinated protection with Littelfuse SIDACtor® protection thyristor devices and GDTs, without series resistors
- RoHS compliant and Halogen Free
- Clip fully compatible with RoHS/lead-free solder alloys and higher temperature profiles associated with lead-free assembly
- Available in ratings of 0.5-2.0 Amperes

Applications

- Telecom equipment (POTS) applications such as modems, answering machines, telephones, fax machines, and security systems
- Network equipment, such as:

  - SLIC interface portion of Fiber to the Curb (FTTC) and Fiber to the Premises (FTTP)

  - Non-Fiber SLIC interface for Central Office (CO) locations and Remote Terminals (RT)

  - xDSL applications such as ADSL, ADSL2+, VDSL, and VDSL2+

  - Ethernet 10/100/1000BaseT

  - ISDN "U" interface

  - Baystation T1/E1/J1, T3 (DS3) trunk cards

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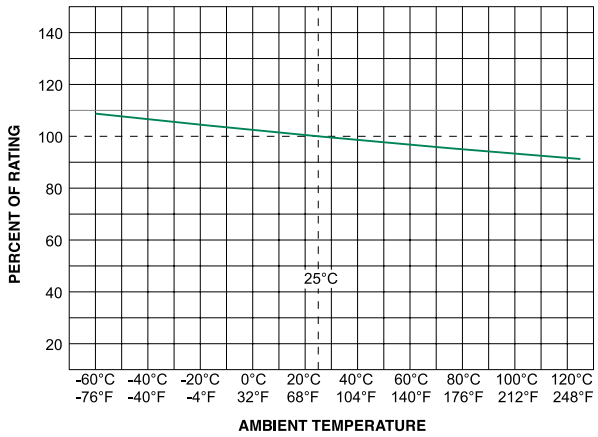
Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Agency Approvals
						c UL us
0.50	.500	600	60 A @600 VAC	0.560	0.840[1]	x
1.25	1.25	600		.1040	16.5[1]	x
2.00	002.	600		.0450	17.5[1]	x

[1] I^2t is calculated at 10 msecs. or less. I^2t at 10 times rated current has a typical value of: 24 A^2sec (2.0A), 22 A^2sec (1.25A), 1.3 A^2sec (0.5A).

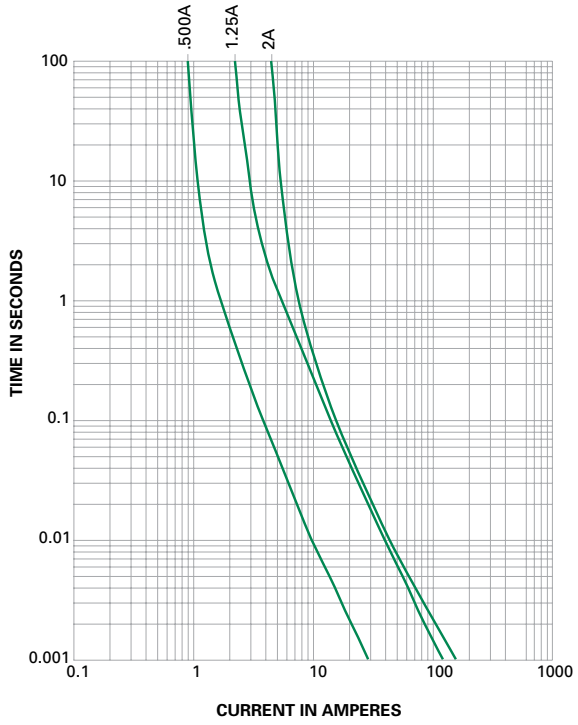
- Typical inductance < 40nH up to 500 MHz.
- Resistance changes 0.5% for every °C.
- Resistance is measured at 10% rated current.

Temperature Re-rating Curve



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

Average Time Current Curves



Maximum Temperature Rise

Telecom Nano²® Fuse	Temperature
04611.25	≤82°C (180°F)
0461002	≤50°C (122°F)

TIA-968-A (formerly FCC part 68) Surge Waveforms

(fuse can not open during type B events)

Surge	Voltage (V)	Waveform (µs)	Current (A)	Repititions	Recommended Fuse
Metallic A	800	10×560	100	1 ea. polarity	1.25
Longitudinal A	1500	10×160	200	1 ea. polarity	1.25
Metallic B	1000	9×720	25	1 ea. polarity	1.25
Longitudinal B	1500	9×720	37.5	1 ea. polarity	1.25

For the type A events the 0.5 fuse will open, providing non-operational compliance. The 1.25 & 2.0 will not open, providing for operational compliance with TIA-968-A type A surge events.

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Surface Mount Fuses

159 Fuse and Clip Series

GR 1089 Inter-building requirements

GR 1089 1st level lighting surge inter-building

(Equipment under test can not be damaged and must continue to operate properly)

Surge	Minimum Peak Voltage (V)	Minimum Peak Current (A)	Max. Rise/Min. Decay (µs)	Repetitions Each Polarity	Fuse Choices
1	600	100	10/1000	25	1.25, 2.0
2	1000	100	10/360	25	1.25, 2.0
3	1000	100	10/1000	25	1.25, 2.0
4	2500	500	2/10	10	1.25, 2.0
5	1000	25	10/360	5	0.5, 1.25, 2.0

If sufficient series resistance is used, then the 0.5 fuse may be used in test conditions 1-4.

GR 1089 2nd level lightning surge telecom port

(Equipment under test shall not become a fire, fragmentation, or electrical safety hazard)

Surge	Minimum Peak Voltage (V)	Minimum Peak Current (A)	Max. Rise/Min. Decay (µs)	Repe-titions Each Polarity	Fuse Choices
1	5000	500	2/10	1	0.5, 1.25, 2.0
Alter-native	5000	500/8=625	8/10	1	0.5, 1.25, 2.0

The 0.5 fuse will open during these test conditions. The 1.25 & 2.0 will not open thus providing operational compliance.

GR 1089 AC power fault 1st level inter-building (fuse not allowed to open)

Test	Vrms	Short Circuit Current (A)	Hits	Duration	Primary Protector	Fuse Choices
1	50	.33	1	15 min.	removed	1.25, 2.0
2	100	.17	1	15 min.	removed	1.25, 2.0
3	200,400, 600	1	60	1 sec.	removed	1.25, 2.0
4	1000	1	60	1 sec.	operative	1.25, 2.0
5	Diagram	Diagram	60	5 secs.	removed	1.25, 2.0
6	600	0.5	1	30 secs.	removed	1.25, 2.0
7	440	2.2	5	2 secs.	removed	1.25, 2.0
8	600	3	1	1.1 secs.	removed	1.25, 2.0
9	1000	5	1	0.4 sec.	in place	1.25, 2.0

GR 1089 AC power fault 2nd level (fuse can open but must open in a safe and controlled manner)

Test Circuite	Vrms	Short (A)	Duration	Fuse
1	120,277	25	15 min.	0.5, 1.25, 2.0
2	600	60	5 secs.	0.5, 1.25, 2.0
3	600	7	5 secs.	0.5, 1.25, 2.0
4	100-600	2.2	15 min..	0.5, 1.25, 2.0
5	Diagram	Diagram	15 min.	0.5, 1.25, 2.0

Fuse must open before wiring simulator fuse (MDL 2.0).

UL60950 Requirements

UL 60950 (EN 60950, formerly UL 1950) Power Cross Test

(L=Longitudinal, M=Metallic)

Test Number	Voltage (V)	Current (A)	Time	Fuse Choices
L1	600	40	1.5 secs.	0.5, 1.25, 2.0
L2	600	7	5 secs.	0.5, 1.25, 2.0
L3	600	2.2	30 min.	0.5, 1.25, 2.0
L4	200	2.2	30 min.	0.5, 1.25, 2.0
L5	120	25	30 min.	0.5, 1.25, 2.0
M1	600	40	1.5 secs.	0.5, 1.25, 2.0
M2	600	7	5 secs.	0.5, 1.25, 2.0
M3	600	2.2	30 min.	0.5, 1.25, 2.0
M4	600	2.2	30 min.	0.5, 1.25, 2.0

Selection of test number depends on current limiting F fire enclosure/spacing of end product

- 26 AWG line cord removes L1/M1 test requirement
- L5 conducted only if product does not pass section 6.1.2
- L2,M2,L3,M3,L4,M4 conducted if not in a fire enclosure

Fuse must open before the wiring simulator fuse (MDL 2.0).

UL 60950 (EN 60950, formerly UL 1950) Impulse Test and Steady-State Electric Strength Test

Test	Voltage (V)	Current (A)	Waveform	Repeti-tions	Fuse Choices
Impulse					
For handheld units	2500	62.5	10×700ms	+ 10 w/60 secs. rest	0.5, 1.25, 2.0
Non handheld	1500	37.5	10×700ms	+ 10 w/60 secs. rest	0.5, 1.25, 2.0
Steady-State					
For handheld units	1500		60Hz		0.5, 1.25, 2.0
Non handheld	1000		60Hz		0.5, 1.25, 2.0

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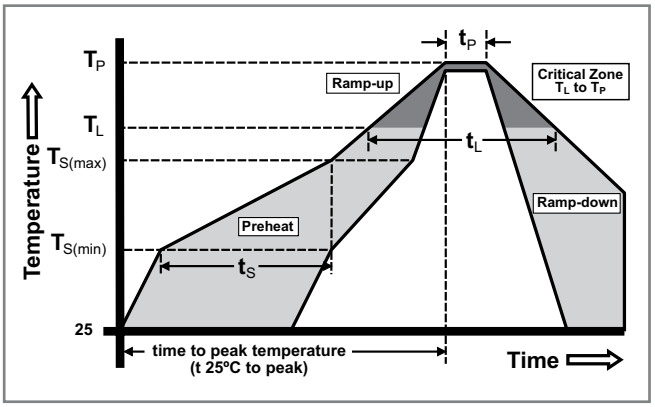
Soldering Parameters

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 seconds
Average Ramp-up Rate (Liquidus Temp (T_L) to peak)		3°C/second max.
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max.
Reflow	-Temperature (T_L) (Liquidus)	217°C
	-Temperature (t_L)	60 – 90 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to peak Temperature (T_P)		8 minutes max.
Do not exceed		260°C



Product Characteristics

Materials	**Fuse Body:** Ceramic **Fuse Caps/Terminals:** Silver-plated Brass **Clip Base:** Gold-plated **Clip Terminals:** Nickel-plated
Product Marking	Brand Logo, Current Rating, 'T'
Insulation Resistance (after opening)	MIL-STD-202, Method 302, Test condition A (10,000 ohms, minimum)
Operating Temperature	-55°C to 125°C with proper re-rating
Humidity Test	85°C/ 85% RH, 1000 hours
Solderability	MIL-STD-202, Method 208/IPC EIA J-STD-002, Test Condition A
Resistance to Solvents	MIL-STD-202, Method 215 (3 solvent types)
Thermal Shock	MIL-STD-202, Method 107, Test Condition B3 (95 cycles -65°C to +125°C)
Mechanical Shock	MIL-STD-202, Method 213, Test Condition I (100G's peak for 6 msecs.)
Vibration	MIL-STD-202, Method 201, (10-55 Hz)
Moisture Resistance	MIL-STD-202, Methold 106, High Humidity (90-98% RH), Heat (65°C)
Salt Spray/ Atmosphere	MIL-STD-202, Method 101, Test Condition B (48 hours)
Terminal Attachment	MIL-STD-202, Method 211, Test Condition A, 5 lbs applied to end caps

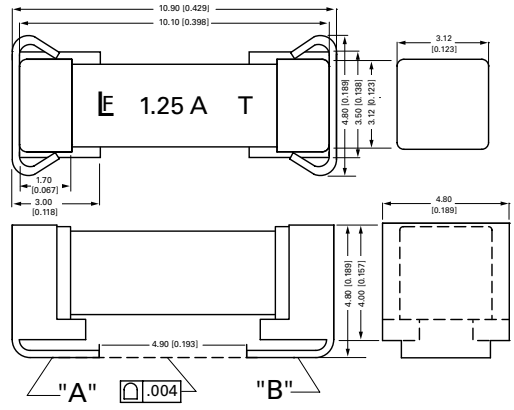
Part Numbering System

0159 1.25 M R

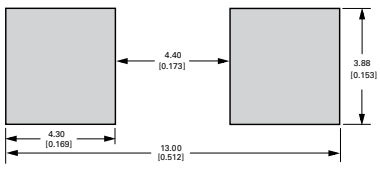
- **SERIES**
- **AMP Code**
  Refer to Electrical Characteristics table
- **QUANTITY Code**
  M = 1000 pcs
- **PACKAGING Code**
  R = Tape and Reel

Example:
0.5 amp product is 0159 **.500** MR
(1.25 amp shown)

Dimensions



Recommended Pad Layout



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
24mm Tape and Reel	EIA RS-481-2 (IEC 286, part 3)	1000	MR

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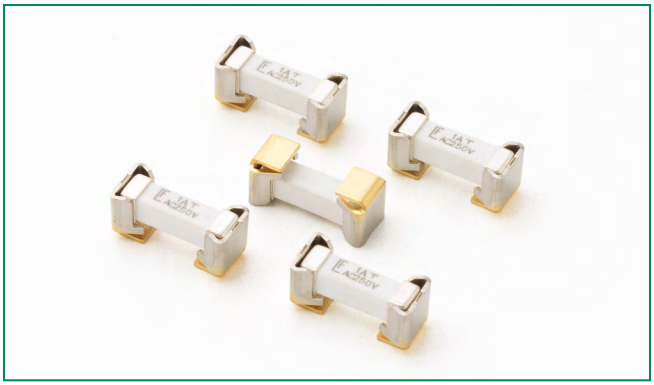
160 Series Fuse and Clip Assembly



Description

The 160 Series product is a metal fuse clip with pre-installed Littelfuse 443 Series Fuse. This fuse and clip combination can be automatically installed in PC Boards in one efficient manufacturing operation. It permits quick and easy fuse replacement without exposing the PC Boards and other components to risks of rework solder heat as required with direct surface mount fuses.

It is designed to enable compliance with the RoHS directive. This product is fully compatible with lead-free solder alloy and higher temperature profiles associated with lead-free assembly.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
PSE	NBK290416-JP1021	1.00A – 5.00A*
c UL us	E14721	0.5A - 5A

Note * - PSE/METI Certification is only applicable to the fuse. Clips do not require certification for the Japanese Market.

Features

- Offer low profile easily-replaceable fuse alternative compatible with automated PCB surface mount equipment
- Comes supplied with Littelfuse 443 Series 250V Nano2® Fuse
- RoHS compliant and Halogen Free
- Clip fully compatible with RoHS/lead-free solder alloys and higher temperature profiles associated with lead-free assembly
- 0.5A - 5A ampere rating available

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
250%	120 seconds, Maximum

Applications

- AC/DC power adaptor
- Telecom equipment system power
- Portable system built-in AC/DC converter
- High voltage DC/DC converter
- Lighting System
- LED Lighting

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Nominal Voltage Drop (mV)	Agency Approvals	
							PSE	c UL us
0.50	0.50	250	50 A @ 250 VAC	.5974	1.96	334		X
0.75	0.75	250		.2729	3.025	223		X
1.00	001.	250		.1826	9.00	207	X	X
1.50	01.5	250		.1100	15.21	210	X	X
2.00	002.	250		.0511	18.50	117	X	X
2.50	02.5	250		.0392	22.20	156	X	X
3.00	003.	250		.0276	59.29	103	X	X
3.50	03.5	250		.0199	59.34	87	X	X
4.00	004.	250		.0160	122.5	83	X	X
5.00	005.	250		.0115	180.6	73	X	X

Notes:
1. Cold resistance measured at less than 10% of rated current at 23°C.
2. Agency Approval Table Key: X=Approved or Certified, P=Pending.

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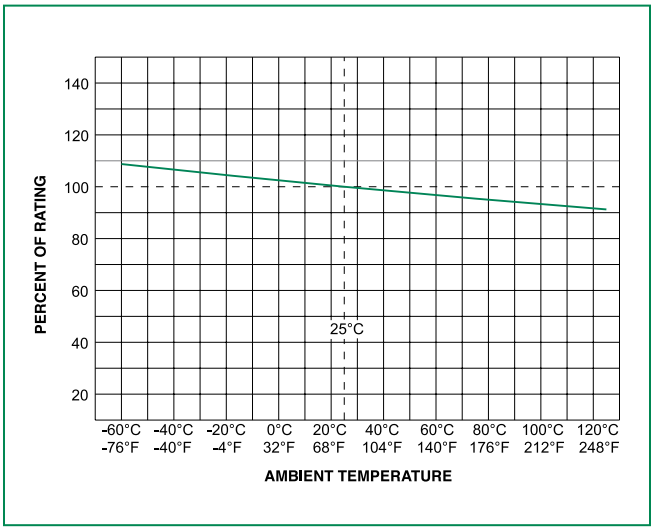
Revised: 03/03/17

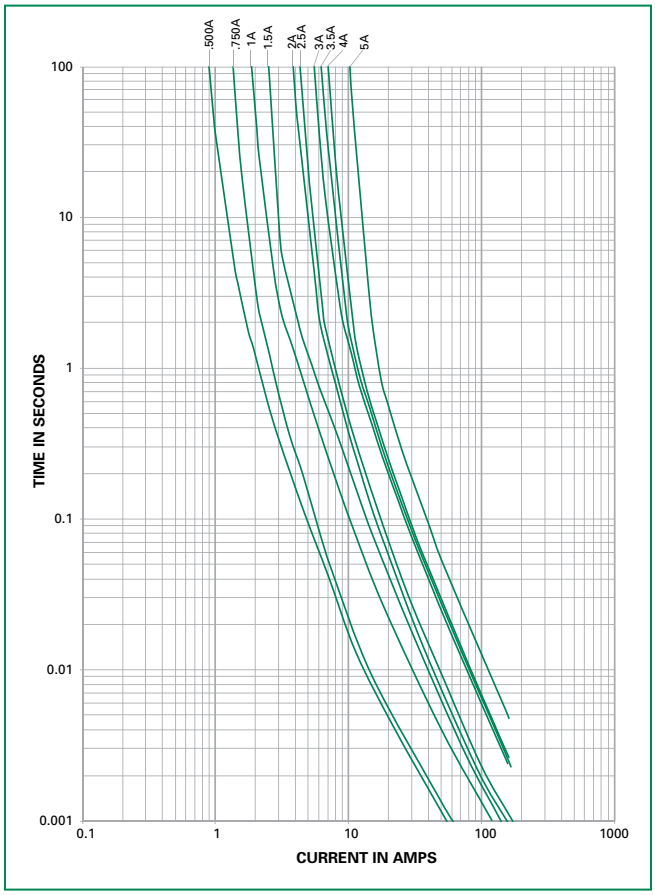
Temperature Re-rating Curve



Note:

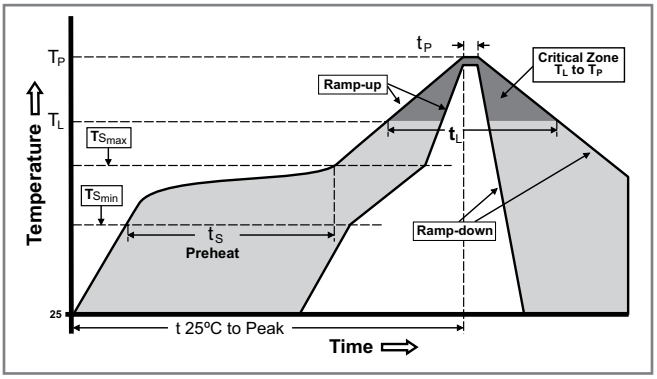
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

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 – 180 seconds
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 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °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



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Surface Mount Fuses

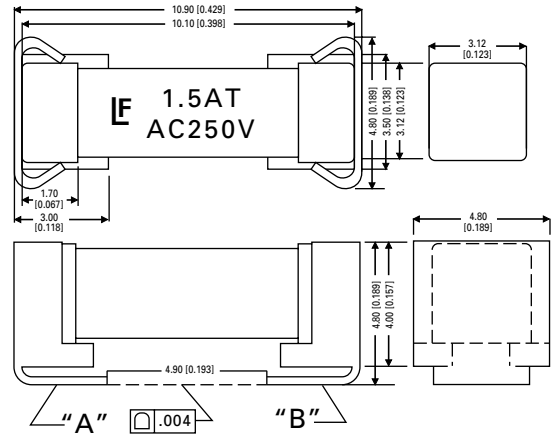
NANO2® > 160 Fuse and Clip Series

Product Characteristics

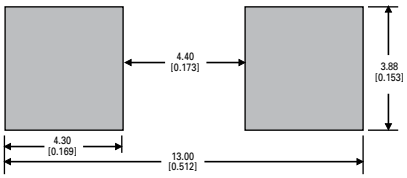
Materials	**Body:** Ceramic **Cap:** Silver-plated Brass
Product Marking	Brand, Ampere Rating, Voltage Rating, UMF Logo
Insulation Resistance (after Opening)	MIL-STD-202, Method 302, Test Condition A (10,000 ohms, Minimum)
Solderability	MIL-STD-202, Method 208
Resistance to Soldering Heat	MIL-STD-202, Method 210, Test Condition B (10 seconds at 260°C)
Moisture Sensitivity Level	Level 1 J-STD-020

Operating Temperature	–55°C to 125°C with proper re-rating
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, -65°C to 125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Moisture Resistance	MIL-STD-202, Method 106, High Humidity (90-98% RH), Heat (65°C)
Salt Spray	MIL-STD-202, Method 101, Test Condition B
Mechanical Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 msecs.)

Dimensions



Recommended Pad Layout



Part Numbering System

160 01.5 M R

SERIES

AMP Code
Refer to Electrical Specifications table

QUANTITY Code
M = 1000 pcs

PACKAGING Code
R = Tape and Reel

Example:
1.5 amp product is 0160**01.5** MR

Packaging

Form Factor	Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Surface Mount	24mm Tape and Reel	EIA-RS 481-2 (IEC 286, part 3)	1000	MR

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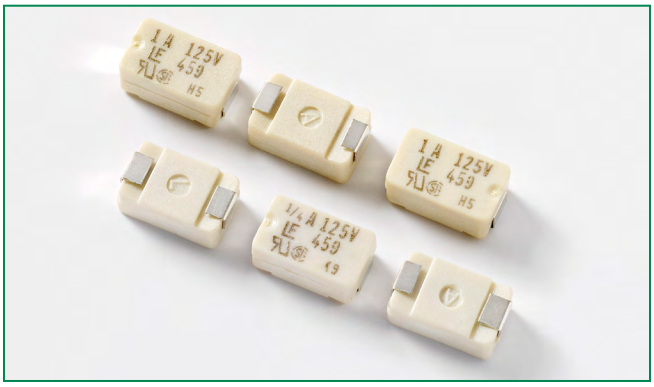
459 Series PICO® Very Fast-Acting Surface Mount Fuse



Description

The 459 Series Very Fast-Acting SMF Fuse is based on Littelfuse PICO® fuse technology, though offered in a surface mount package.

This series of devices meets the requirements of the RoHS directive.

Features

- Very Fast-Acting
- Wide current rating range: 62mA to 5A
- Wide operating temperature range
- Low temperature re-rating
- RoHS compliant

Applications

- Wireless basestation
- Network equipment
- Telecom equipment

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.062 - 5A
	29862	0.125 - 5A
	NBK030205-E10480B	1A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	1 second, Maximum
300%	0.1 second, Maximum

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals		
0.062	.062	125	50 A @125 VAC 300 A @125 VDC	7.0000	0.000075	x		
0.125	.125	125		1.7000	0.00163	x	x	
0.250	.250	125		0.6650	0.0106	x	x	
0.375	.375	125		0.3950	0.0254	x	x	
0.500	.500	125		0.3020	0.0546	x	x	
0.750	.750	125		0.1750	0.155	x	x	
1.00	001.	125		0.1280	0.281	x	x	x
1.50	01.5	125		0.0816	0.650	x	x	x
2.00	002.	125		0.0468	0.421	x	x	x
2.50	02.5	125		0.0350	0.721	x	x	x
3.00	003.	125		0.0290	1.23	x	x	x
3.50	03.5	125		0.0233	1.65	x	x	x
4.00	004.	125		0.0197	2.35	x	x	x
5.00	005.	125		0.0151	3.90	x	x	x

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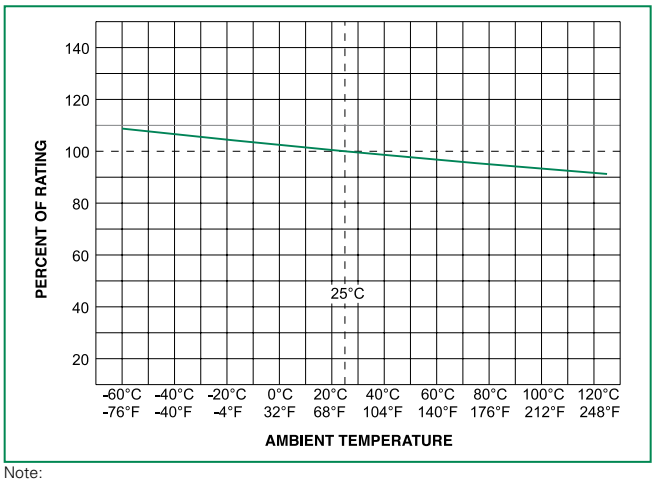
Surface Mount Fuses

PICO® SMF Fuse > 459 Series

Temperature Re-rating Curve



Note:

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

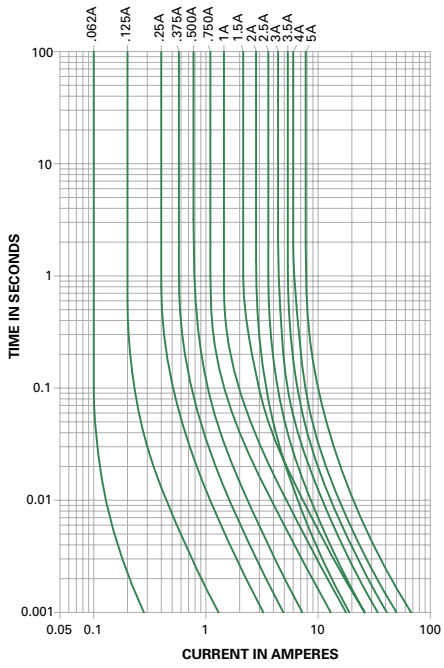
Soldering Parameters

Wave Soldering	260°C, 10 seconds max.
Reflow Soldering	260°C, 30 seconds max.

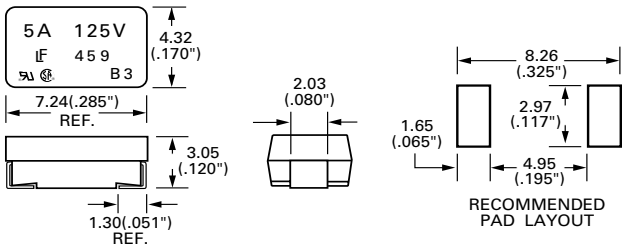
Product Characteristics

Materials	**Body:** Molded Thermoplastic **Terminations:** 100% Tin-plated Copper
Solderability	MIL-STD-202, Method 208
Product Marking	**Body:** Brand Logo, Current Rating, Voltage Rating, Series Code, Date Code, Agency Approved Logo
Moisture Sensitivity	Level 1 J-STD - 020
Operating Temp.	–55°C to 125°C (Consider re-rating)
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 msecs.)
Vibration	MIL-STD-202, Method 201 (10–55 Hz, 0.06 inch total excursion)
Salt Spray	MIL-STD-202, Method 101, Test Condition B (48 hours)
Insulation Resistance (After Opening)	MIL-STD-202, Method 302, (10,000 ohms minimum at 100 volts)
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (–65 to 125°C)
Moisture Resistance	MIL-STD-202, Method 106, High Humidity (90-98 RH), Heat (65°C)

Average Time Current Curves



Dimensions



Part Numbering System

0459 .500 UR

SERIES

AMP Code
Refer to Electrical Characteristics table

QUANTITY Code
UR = 500 pcs
ER = 2500 pcs

PACKAGING Code
R = Tape and Reel

Example:
0.62 Amp product is 0459 **.062** UR (.5 Amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
12mm Tape and Reel	EIA RS-481-1 (IEC 286, part 3)	500	UR
		2500	ER

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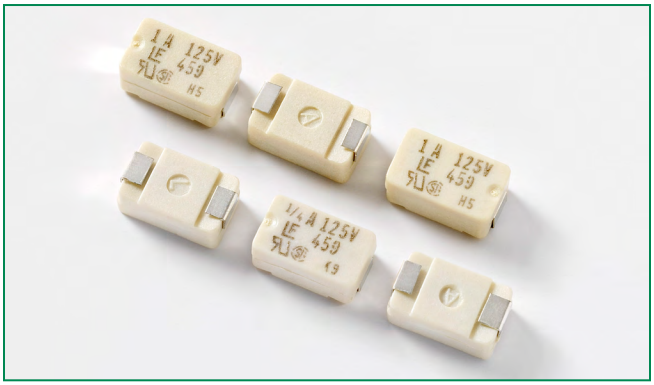
460 Series PICO® Slo-Blo® Surface Mount Fuse



Description

The 460 Series Slo-Blo® SMF Fuse is based on Littelfuse PICO® fuse through-hole technology, though offered in a surface mount package.

This series of devices meet the requirements of the RoHS directive.

Features

- High inrush current withstand capability
- Wide current rating range: 0.375A to 5A
- Wide operating temperature range
- Halogen free and RoHS compliant

Applications

- Wireless basestation
- Network equipment
- Telecom equipment

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.375A - 5A
	29862	0.375A - 5A
	NBK030205-E10480B	1A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	1 second, Min.; 120 seconds, Max.
300%	0.2 second, Min.; 3 seconds, Max.
800%	0.02 second, Min.; 0.1 second, Max.

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Agency Approvals		
0.375	.375	125	50 A @125 VAC 50 A @125 VDC	1.7400	0.085	x	x	
0.500	.500	125		1.1900	0.210	x	x	
0.750	.750	125		0.4970	0.760	x	x	
1.00	001.	125		0.2800	2.01	x	x	x
1.50	01.5	125		0.1170	3.94	x	x	x
2.00	002.	125		0.0720	7.60	x	x	x
2.50	02.5	125		0.0520	13.0	x	x	x
3.00	003.	125		0.0380	18.15	x	x	x
3.50	03.5	125		0.0240	26.8	x	x	x
4.00	004.	125		0.0200	35.0	x	x	x
5.00	005.	125		0.0133	54.8	x	x	x

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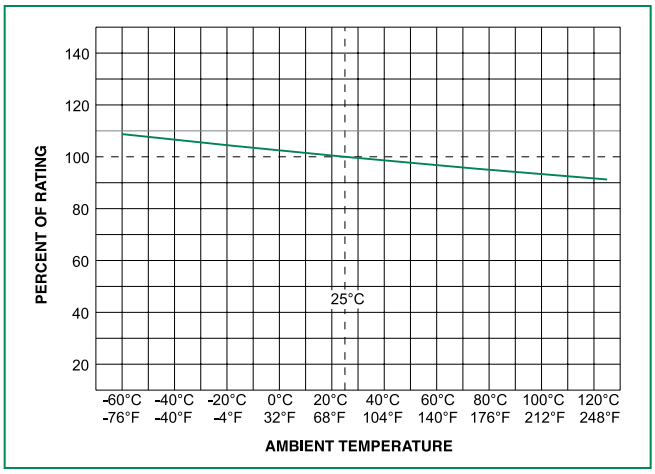
Surface Mount Fuses

PICO® SMF Fuse > 460 Series

Temperature Re-rating Curve



Note:

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

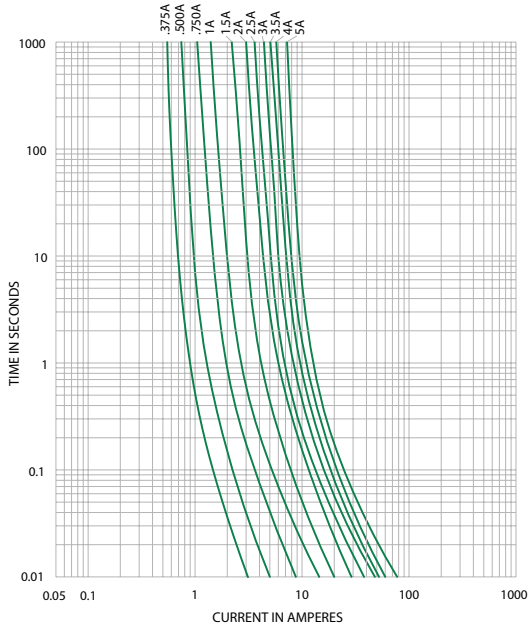
Soldering Parameters

Wave Soldering	260°C, 3 seconds max.
Reflow Soldering	230°C, 30 seconds max.

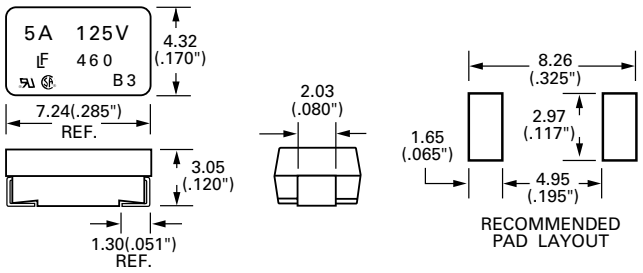
Product Characteristics

Materials	**Body:** Molded Thermoplastic **Terminations:** 100% Tin-plated Copper
Solderability	MIL-STD-202, Method 208
Product Marking	**Body:** Brand Logo, Current Rating, Voltage Rating, Series Code, Date Code, Agency Approved Logo
Moisture Sensitivity	Level 1 J-STD - 020
Operating Temp.	–55°C to 125°C (Consider re-rating)
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 msecs.)
Vibration	MIL-STD-202, Method 201 (10–55 Hz, 0.06 inch total excursion)
Salt Spray	MIL-STD-202, Method 101, Test Condition B (48 hours)
Insulation Resistance (After Opening)	MIL-STD-202, Method 302, (10,000 ohms minimum at 100 volts)
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (–65°C to 125°C)
Moisture Resistance	MIL-STD-202, Method 106, High Humidity (90-98 RH), Heat (65°C)

Average Time Current Curves



Dimensions



Part Numbering System

0460 .500 UR

SERIES

AMP CODE
Refer to Electrical Characteristics table

QUANTITY CODE
UR = 500 pcs
ER = 2500 pcs

PACKAGING CODE
R = Tape and Reel

Example:
1 Amp product is 0460 **.001** UR (.5 Amp product shown above).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
12mm Tape and Reel	EIA RS-481-1 (IEC 286, part 3)	500	UR
		2500	ER

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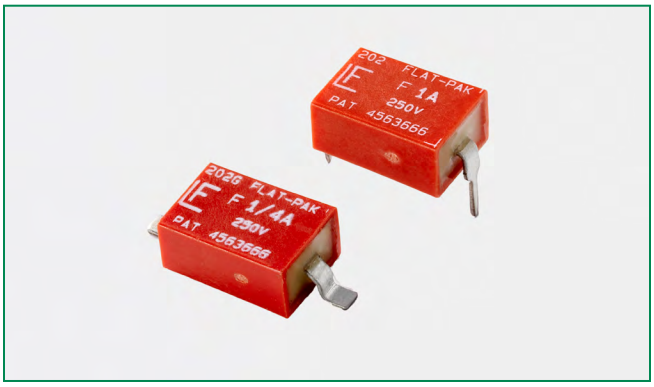
202 Series Fuse



Description

Fast-Acting and Slo-Blo® Fuse versions of the Flat-Pak® Fuse designs are available. Both designs are available in either a gull-wing surface mount package or a DIP configuration for through-hole mounting. These fuse designs feature a 250 VAC rating in a low profile, rectangular package.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.063A - 5A
	29862	0.063A - 5A

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	2 seconds, Maximum

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Agency Approvals	
0.062	.062	250	50A@250VAC	7.9000	0.000220	x	x
0.125	.125	250		2.4500	0.00180	x	x
0.250	.250	250		0.8800	0.0147	x	x
0.500	.500	250		0.2980	0.0363	x	x
0.750	.750	250		0.1660	0.0980	x	x
1.00	001.	250		0.1190	0.192	x	x
1.50	01.5	250		0.0701	0.540	x	x
2.00	002.	250		0.0469	1.07	x	x
2.50	02.5	250		0.0455	1.76	x	x
3.00	003.	250		0.0327	1.71	x	x
4.00	004.	250		0.0244	3.00	x	x
5.00	005.	250		0.0174	4.68	x	x

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Surface Mount Fuses

FLAT-PAK® Fast-Acting Fuse > 202 Series

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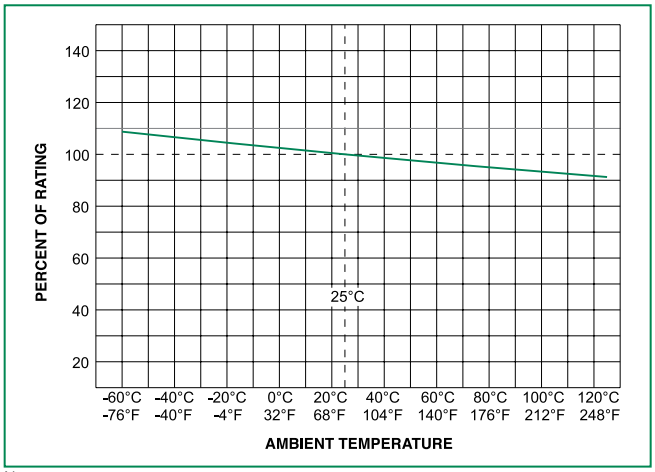
Temperature Re-rating Curve



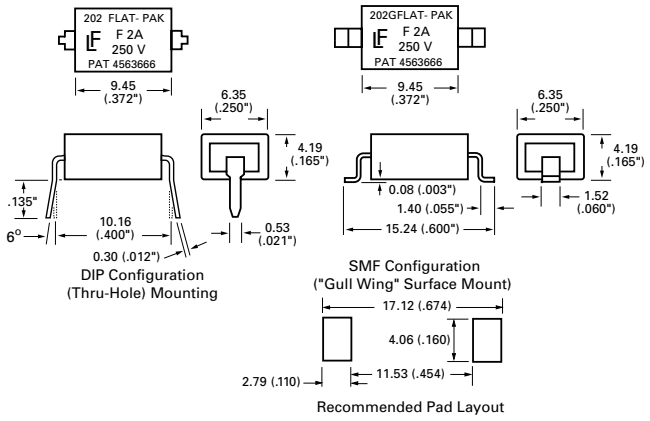
Note:

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

Soldering Parameters

Wave Soldering	260°C, 3 seconds max.
Reflow Soldering	215°C, 30 seconds max.

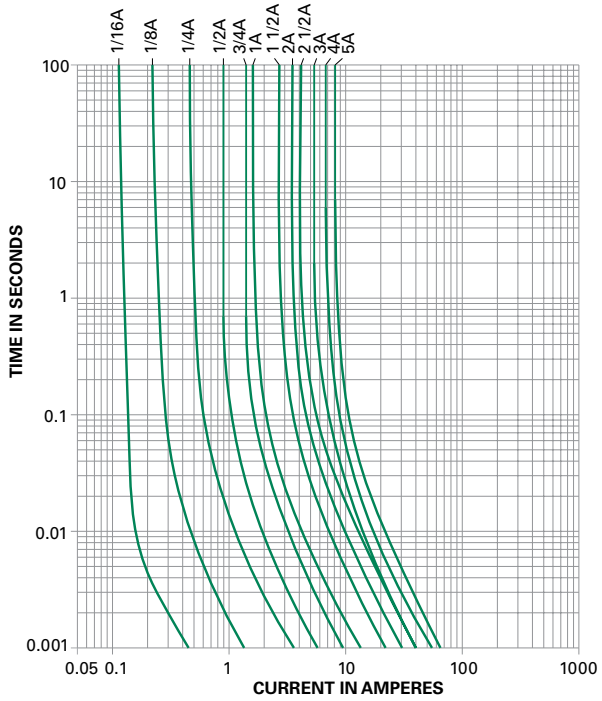
Dimensions



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Surface Mount Fuses			
Bulk	–	100	HXG
24mm Tape and Reel	EIA 481 (IEC60286, part 3)	500	URG
Through Hole Fuses			
Antistatic Magazine	–	100	H

Average Time Current Curves



Product Characteristics

Materials	Body: Thermoplastic Terminations: Tin/Lead Plated Copper
Solderability	MIL-STD-202, Method 208.
Cleaning	Board washable in most common solvents.
Operating Temperature	–55°C to 125°C

Part Numbering System

Surface Mount Fuses:

0202 002. HXG

- **Series**
- **Amp Code**
  Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code**
  HXG = 100
  URG = 500

Through Hole Fuses:

0202 002. H

- **Series**
- **Amp Code**
  Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code**
  H = 100

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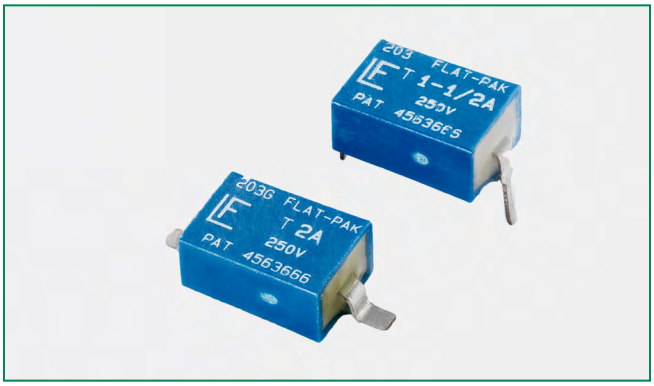
Surface Mount Fuses

FLAT-PAK® Slo-Blo® Fuse > 203 Series

203 Series Fuse



Description

Fast-Acting and Slo-Blo® Fuse versions of the Flat-Pak® Fuse designs are available. Both designs are available in either a gull-wing surface mount package or a DIP configuration for through-hole mounting. These fuse designs feature a 250 VAC rating in a low profile, rectangular package.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	0.250A - 5A
	29862	0.250A - 5A

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	1 second, Min; 30 seconds Max.

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Agency Approvals	
0.25	.250	250	50A@250VAC	1.320	0.0126	x	x
0.50	.500	250		0.433	0.112	x	x
0.75	.750	250		0.158	0.462	x	x
1.00	001.	250		0.0755	0.328	x	x
1.50	01.5	250		0.0399	0.850	x	x
2.00	002.	250		0.0337	1.70	x	x
2.50	02.5	250		0.0243	2.87	x	x
3.00	003.	250		0.0197	4.40	x	x
4.00	004.	250		0.0148	11.66	x	x
5.00	005.	250		0.0120	14.7	x	x

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Surface Mount Fuses

FLAT-PAK® Slo-Blo® Fuse > 203 Series

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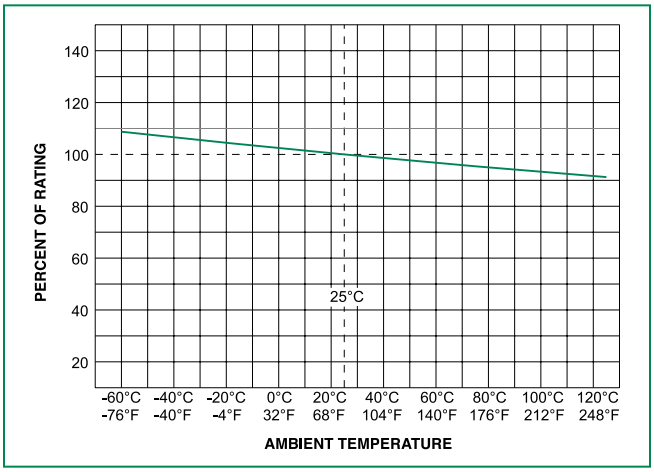
Temperature Re-rating Curve



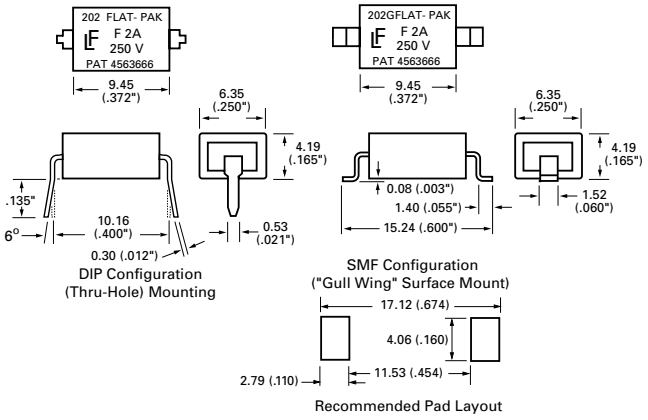
Note:

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

Soldering Parameters

Wave Soldering	260°C, 3 seconds max.
Reflow Soldering	215°C, 30 seconds max.

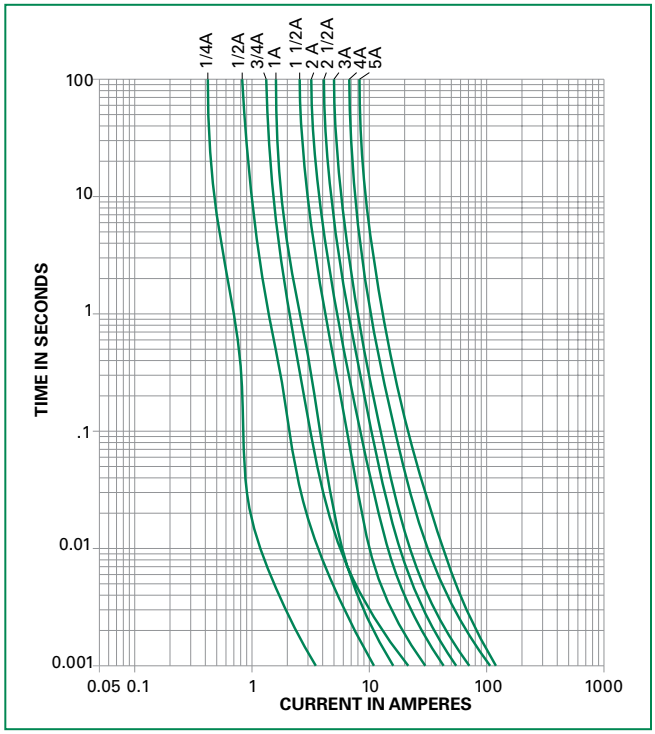
Dimensions



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Surface Mount Fuses			
Bulk	–	100	HXG
24mm Tape and Reel	EIA 481 (IEC60286, part 3)	500	URG
Through Hole Fuses			
Antistatic Magazine	–	100	H

Average Time Current Curves



Product Characteristics

Materials	Body: Thermoplastic Terminations: Tin/Lead Plated Copper
Solderability	MIL-STD-202, Method 208.
Cleaning	Board washable in most common solvents.
Operating Temperature	–55°C to 125°C

Part Numbering System

Surface Mount Fuses:

0203 002. HXG

- **Series**
- **Amp Code**
  Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code**
  HXG = 100
  URG = 500

Through Hole Fuses:

0203 002. H

- **Series**
- **Amp Code**
  Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code**
  H = 100

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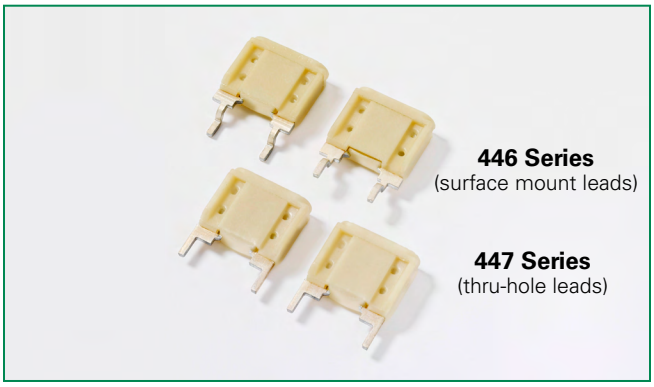
446/447 Series EBF Fuse Fast-Acting



Description

The 446/447 series are circuit-board mountable, flat profile, fast-acting fuses designed for protection of electronic ballasts and power inverter applications. The 446 series is designed with leads for surface mount applications, and the 447 series is designed with leads for through-hole applications.

This series of devices are 100% lead-free and meets the requirements of the RoHS directive.

Features

- RoHS compliant and 100% lead-free
- Ideal for use in electronic lighting ballast, power supply and power inverter applications.
- Rated for use in 125, 250, 277 and 350 VAC circuits.
- Based on the proven reliability of the automotive MINI® Fuse; available from 2 through 10 amperes.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E71611	2A - 10A
	29862	2A - 10A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	0.15 sec. Min.; 5 sec. Max.

Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2sec)	Agency Approvals	
2.00	002.	350	100 amperes @350 VAC, 50 amperes @125 VDC and 450 amperes @60VDC	0.0563	2.8	x	x
3.00	003.	350		0.0336	9.4	x	x
4.00	004.	350		0.0237	17	x	x
5.00	005.	350		0.0178	25	x	x
7.50	07.5	350		0.0110	68	x	x
10.0	010.	350		0.0073	93	x	x

Additional Information

Datasheet 446 Series
Resources 446 Series
Samples 446 Series
Datasheet 447 Series
Resources 447 Series
Samples 447 Series

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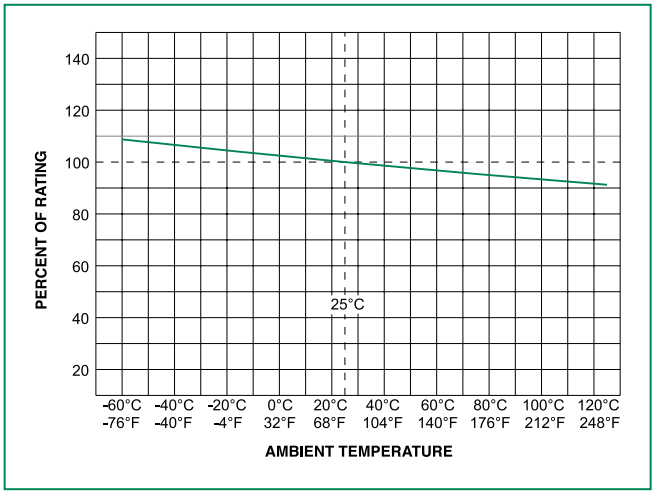
Temperature Re-rating Curve



Note:

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

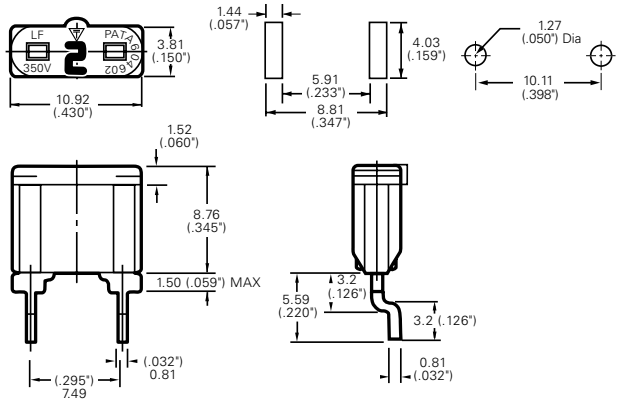
Soldering Parameters

446 Series:
Reflow Solder — 235°C, 5 seconds maximum.
No-clean process recommended.
Wave Solder — Not recommended.
Non-plated terminal surfaces may not meet MIL-STD-202, Method 208.

447 Series:
Contact Littelfuse for soldering parameters.
Inside terminal face of each lead is non-plated zinc.
Non-plated zinc terminal faces may not meet MIL-STD-202, method 208. To ensure that the fuse is acceptable for the application, appropriate application testing should be performed.

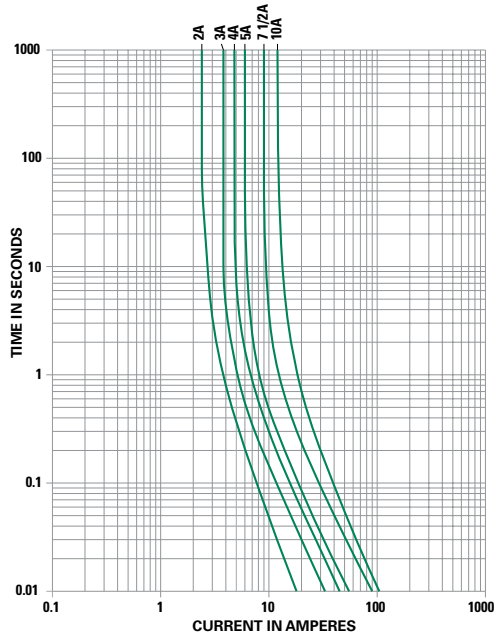
Dimensions

Reference Dimensions (Inches) | **Recommended Pad Layout** | **447 Mounting Holes**



For 447 dimensions, please contact Littelfuse for specifications.

Average Time Current Curves



Product Characteristics

Materials	Body: Plastic Body – Terminations: Tin-Lead (95/5) plated Zn, Ni barrier
Cleaning	No-cleaning process recommended
Operating Temperature	–40°C to 125°C

Part Numbering System

Surface Mount Fuses:

0446 002. ZRP

- Series
- Amp Code
- Quantity Code: ZRP = 800

Through Hole Fuses:

0447 002. YXP

- Series
- Amp Code
- Quantity Code: YXP = 4000

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
446 Series			
24mm Tape and Reel	EIA RS-481-1 (IEC 286, part 3)	800	ZRP
447 Series			
Bulk Pack	–	4000	YXP

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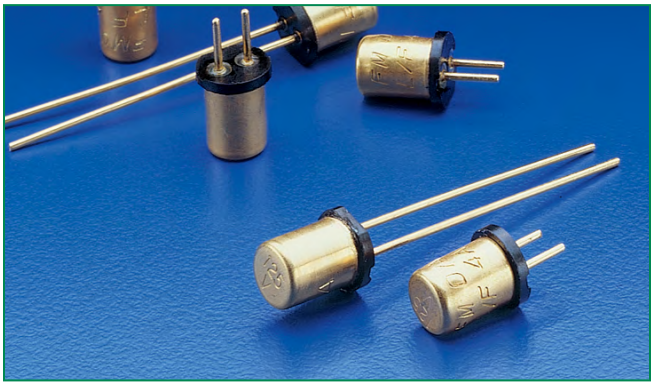
262/268/269 Series, MICRO™ Very Fast-Acting Fuse (High-Reliability)



Description

The 262/268/269 Series are high–reliability MICRO™ fuses, with a 125V rating, very fast-acting type with high breaking capacity. The 269 series is listed under the Department of Defense Quality Product List.

Features

- Military grade available
- Available from very low ampere of 0.002A to 5A
- Available in plug-in and radial leaded

Applications

Protection of electrical, electronic, and communication equipment having printed circuit boards (PCBs) usable in direct current (DC) and alternating current (AC) (up to 400 hertz (Hz)) circuits capable of withstanding and functioning in extreme conditions found in Spacecraft or Military applications as described in MIL-PRF-23419.

Agency Approvals

Agency	Agency File Number	Ampere Range	Series
	E10480	0.002A - 5A	262 & 268
	29862	0.002A - 5A	262 & 268
QPL	FM07A	0.002A - 5A	269

Electrical Characteristics

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.002 – 15	4 Hours, **Min.**
200%	0.002 – 0.3	5 Seconds, **Max.**
	0.4 - 5	2 Seconds, **Max.**

Electrical Characteristics

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Agency Approvals		
							QPL
.002	.002	125	10,000A@125VAC/VDC	2000	X	X	X
.005	.005	125		280	X	X	X
.010	.010	125		94.0	X	X	X
.015	.015	125		44.0	X	X	X
.031	.031	125		16.45	X	X	X
.050	.050	125		3.20	X	X	X
.062	.062	125		2.25	X	X	X
.100	.100	125		1.17	X	X	X
.125	.125	125		1.0	X	X	X
.200	.200	125		2.30	X	X	X
.250	.250	125		1.75	X	X	X
.300	.300	125		1.25	X	X	X
.400	.400	125		0.227	X	X	X
.500	.500	125		0.167	X	X	X
.600	.600	125		0.140	X	X	X
.700	.700	125		0.114	X	X	X
.750	.750	125		0.104	X	X	X
.800	.800	125		0.094	X	X	X
1.00	001.	125		0.100	X	X	X
01.5	01.5	125		0.063	X	X	X
2.00	002.	125		0.046	X	X	X
3.00	003.	125		0.034	X	X	X
4.00	004.	125		0.019	X	X	X
5.00	005.	125		0.018	X	X	X

Please contact Littelfuse for Average Time Current Curve.

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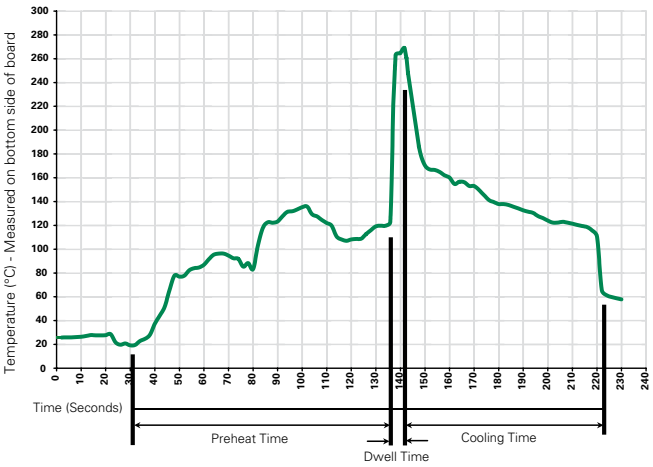
Soldering Parameters - Wave Soldering



Recommended Process Parameters:

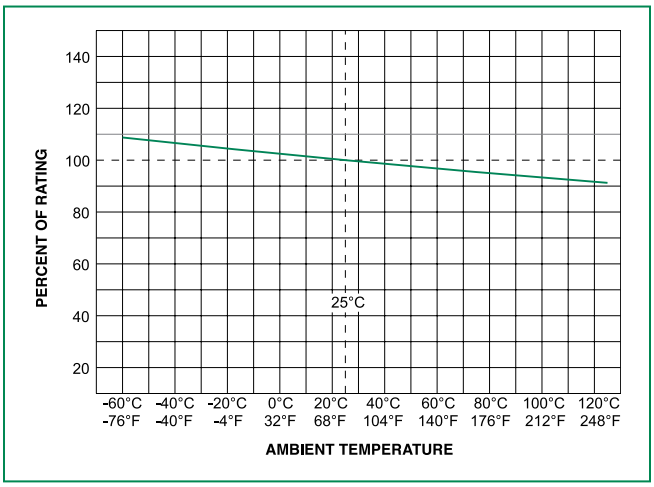
Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100° C
Temperature Maximum:	150° C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260° C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350° C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Temperature Re-rating Curve



Notes:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.
2. Please contact Littelfuse for average time current curve.

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Radial Lead Fuses

MICRO™ > Very Fast-Acting Fuse > 262/268/269 Series

Littelfuse
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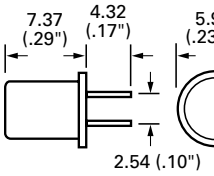
Product Characteristics

Materials	Gold-Plated Copper Leads, Type II (Fuse cap is also Gold-Plated)
Weight	262 and 269 Series .36 Grams; 268 Series .48 Grams
Lead Pull Force	MIL-STD-202, Method 211, Test Condition A (will withstand a 5 lb. axial pull test)
AQL (Electrical Characteristics)	Certified to 1% AQL
Sampling	Per MIL-STD-105, Inspection Level II
Traceability and Identification Records	Controlled by lot number and retained on file for a minimum of three years. Copies of Lot Certification Test data available when requested with order
Options	Special screening tests, burn-in, etc. can be supplied on special order to meet specific requirements
Product Marking	262 / 268 Series: Brand logo, current and voltage ratings 269 Series: Brand logo, current and voltage ratings and agency approval mark

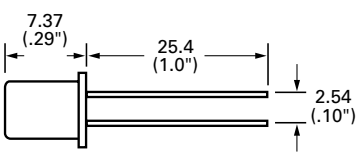
Operating Temperature	–55°C to +125°C
Shock	(1/500): MIL-STD-202, Method 213, Test Condition A (50 G's peak for 11 milliseconds). (1/200–5): MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)
Vibration	MIL-STD-202, Method 201 (10–55 Hz); MIL-STD-202, Method 204, Test Condition C (55–2000 Hz at 10 G's Peak)
Salt Spray	MIL-STD-202, Method 101, Test Condition B
Seal Test	MIL-STD-202, Method 112, Test Condition A
Insulation Resistance (After Opening)	MIL-STD-202, Method 302, Test Condition A (1/2 Megohm minimum)
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (–65°C to 125°C)
Moisture Resistance	MIL-STD-202, Method 106
Fuses to MIL SPEC	262 Series is available as FM07A on QPL for MIL-PRF-23419/7. To order, change 262 to 269

Dimensions

262 000 **Series**



268 000 **Series**



Part Numbering System

0262 xxxx V

Series

Amp. Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
V = 5

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Bulk	N / A	5	V

Additional Information

Datasheet 262 Series | **Resources 262 Series** | **Samples 262 Series**

Datasheet 268 Series | **Resources 268 Series** | **Samples 268 Series**

Datasheet 269 Series | **Resources 269 Series** | **Samples 269 Series**

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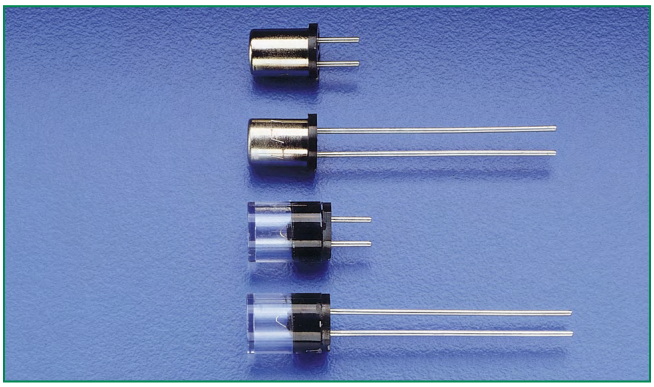
272/273/274/278/279 Series, MICRO™ Very Fast-Acting Fuse



Description

Developed originally for the U.S. Space Program, MICRO™ fuse provides reliability in a compact design. The MICRO™ fuse is available in plug–in or radial lead styles and a complete range of ampere ratings from 0.002A to 5A to suit a wide variety of design needs.

Features

- Military grade available
- High breaking capacity
- Clear cover option to view fuse element status
- Available from very low ampere of 0.002A to 5A
- Plug-in with short or long leads option

Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0.002A - 5A
	29862	0.002A - 5A
QPL	FM02	0.002A - 5A

Applications

- Printed circuit boards and similar equipment
- Electronic components

Electrical Characteristics

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.002 – 5	4 Hours, **Min.**
200%	0.002 – 0.3	5 Seconds, **Max.**
	0.4 - 5	2 Seconds, **Max.**

Electrical Characteristics

Ampere Rating (A)	Amp Code (for all above series)	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals		
								QPL
.002	.002	125	10,000A@125VAC/VDC	2200	0.00000000845	X	X	X
.005	.005	125		280	0.0000000766	X	X	X
.010	.010	125		80.0	0.000000462	X	X	X
.015	.015	125		44.0	0.00000123	X	X	X
.031	.031	125		16.0	0.00000810	X	X	X
.050	.050	125		3.52	0.0000666	X	X	X
.062	.062	125		2.55	0.000115	X	X	X
.100	.100	125		1.38	0.000385	X	X	X
.125	.125	125		1.0	0.000691	X	X	X
.200	.200	125		2.30	0.00409	X	X	X
.250	.250	125		1.75	0.00640	X	X	X
.300	.300	125		1.25	0.00945	X	X	X
.400	.400	125		0.227	0.0251	X	X	X
.500	.500	125		0.167	0.0716	X	X	X
.600	.600	125		0.430	0.0411	X	X	X
.700	.700	125		0.324	0.0710	X	X	X
.750	.750	125		0.293	0.0563	X	X	X
.800	.800	125		0.271	0.113	X	X	X
1.00	001.	125		0.0880	0.0648	X	X	X
01.5	01.5	125		0.0578	0.160	X	X	X
2.00	002.	125		0.0425	0.300	X	X	X
3.00	003.	125		0.0275	0.759	X	X	X
*4.00	004.	125		0.0202	1.38	X	X	X
*5.00	005.	125		0.0156	2.21	X	X	X

* The fuses of 4A and 5A for 272 and 278 Series are obsolete.

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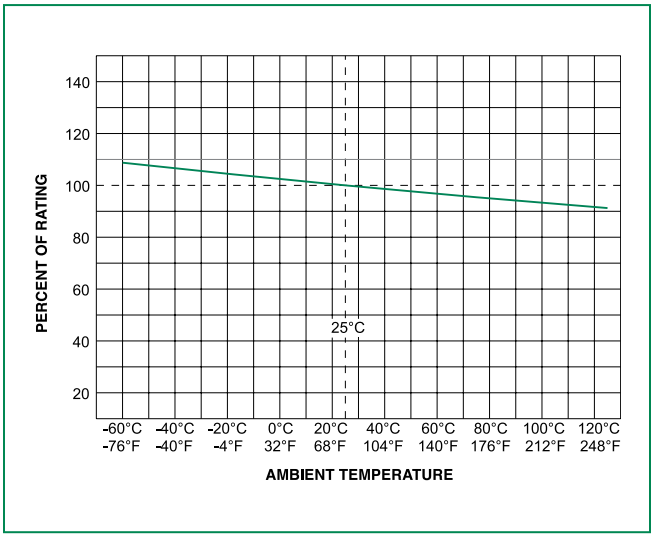
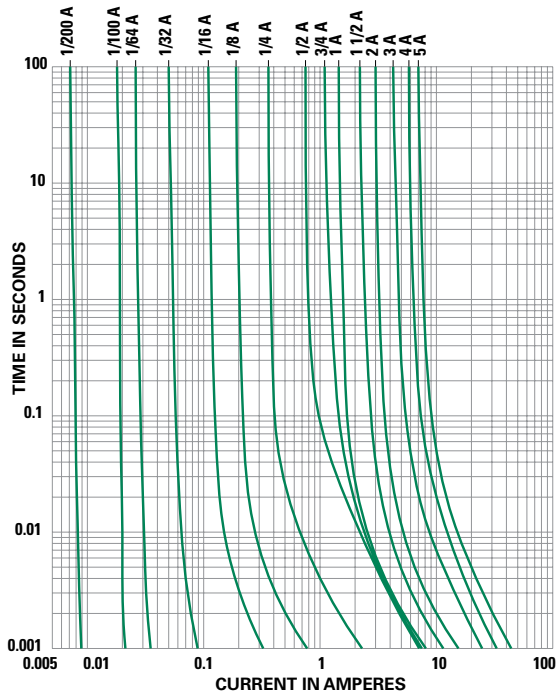
Temperature Re-rating Curve



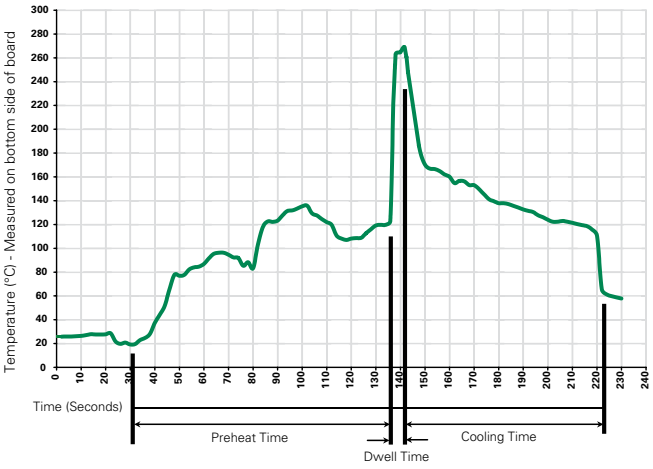
Note:

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

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100° C
Temperature Maximum:	150° C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260° C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350° C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Radial Lead Fuses

MICRO™ > Very Fast-Acting Fuse > 272/273/274/278/279 Series

Product Characteristics

Operating Temperature:	273 and 279: –55°C to +85°C; 272 and 278: –55°C to +125°C
Fuses to MIL SPEC	Military QPL type (FM02). To order, change 273 to 274.
Materials	272 and 278 series cap: Nickel Plated Brass 273, 274 and 279 series cap: Mirror polished Polycarbonate Base: R-4 Ryton Pins: Tin Plated Copper
Product Marking	Current and voltage ratings stamped on cap

Part Numbering System

0273 xxxx V

Series

Amp. Code
Refer to Amp Code column of Electrical Characteristics Table

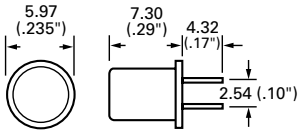
Packaging Code
V = 5
H = 100

Additional Information

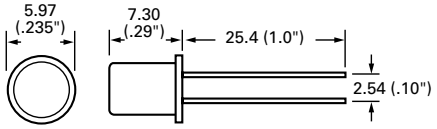
Datasheet 272 Series	**Resources 272 Series**	**Samples 272 Series**
Datasheet 273 Series	**Resources 273 Series**	**Samples 273 Series**
Datasheet 274 Series	**Resources 274 Series**	**Samples 274 Series**
Datasheet 278 Series	**Resources 278 Series**	**Samples 278 Series**
Datasheet 279 Series	**Resources 279 Series**	**Samples 279 Series**

Dimensions

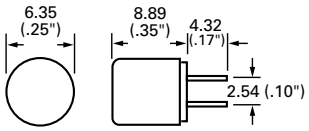
272 000 Series
(Short Lead, Metal Cap)



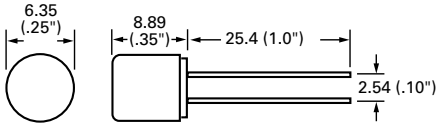
278 000 Series
(Long Lead, Metal Cap)



273 000 and 274 000 Series
(Short Lead, Clear Plastic Cap)



279 000 Series
(Long Lead, Clear Plastic Cap)



NOTE: Amperage and voltage rating stamped on cap.
Leads are tin plated copper; .025" diameter.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Bulk	N / A	5	V
Bulk	N / A	100	H

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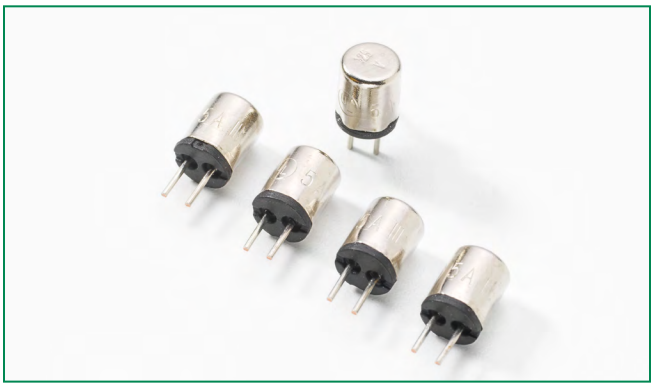
303 Series, TR3, Fast-Acting Fuse

RoHS Pb HF



Description

The 303 Series are TR3, fast-acting type, 125V rated fuses designed in accordance to UL 248–14.

Features

- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- RoHS compliant, Lead-Free and Halogen-Free
- Available from 0.050A to 5A

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E67006	0.050A - 5A
CSA	051378	0.050A - 5A

Applications

- Battery chargers
- Consumer electronics
- Power supplies
- Industrial controllers

Electrical Characteristics

% of Ampere Rating	Opening Time
200	60 Seconds, Maximum

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop $1.0 \times I_N$ max. (mV)	Power Dissipation $1.0 \times I_N$ max. (mW)	Melting Integral $10 \times I_N$ max. (A^2s)	Approvals	
								UL	CSA
0050	50mA	125V	50A @ 125VAC 50A @ 63VDC	2.9203	800	40	0.00007	X	X
0063	63mA	125V		2.7400	780	50	0.00013	X	X
0080	80mA	125V		2.2300	730	60	0.0002	X	X
0100	100mA	125V		4.3800	700	70	0.0004	X	X
0125	125mA	125V		3.4605	650	85	0.0022	X	X
0160	160mA	125V		2.1687	600	100	0.0029	X	X
0200	200mA	125V		1.3500	550	110	0.0042	X	X
0250	250mA	125V		1.1500	500	125	0.0082	X	X
0315	315mA	125V		0.9645	450	145	0.015	X	X
0400	400mA	125V		0.8050	400	160	0.025	X	X
0500	500mA	125V		0.5320	380	190	0.042	X	X
0630	630mA	125V		0.1448	160	100	0.015	X	X
0800	800mA	125V		0.1023	155	125	0.025	X	X
1100	1.00A	125V		0.0830	150	155	0.039	X	X
1125	1.25A	125V		0.0644	145	185	0.059	X	X
1160	1.60A	125V		0.0520	140	225	0.11	X	X
1200	2.00A	125V		0.0400	130	260	0.17	X	X
1250	2.50A	125V		0.0307	125	315	0.23	X	X
1315	3.15A	125V		0.0262	120	380	0.45	X	X
1400	4.00A	125V		0.0178	110	440	1.0	X	X
1500	5.00A	125V		0.0131	105	525	1.5	X	X

Note: 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

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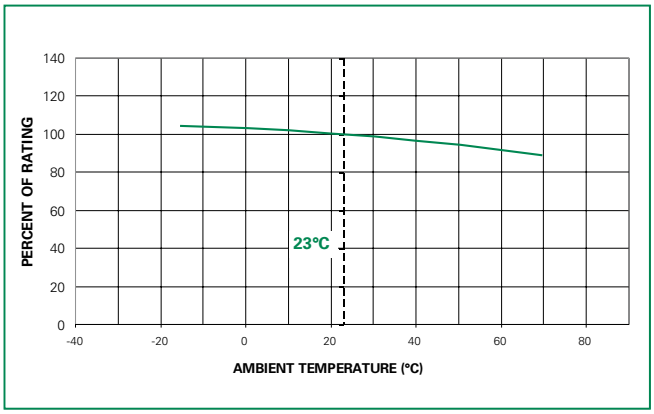
Radial Lead Fuses

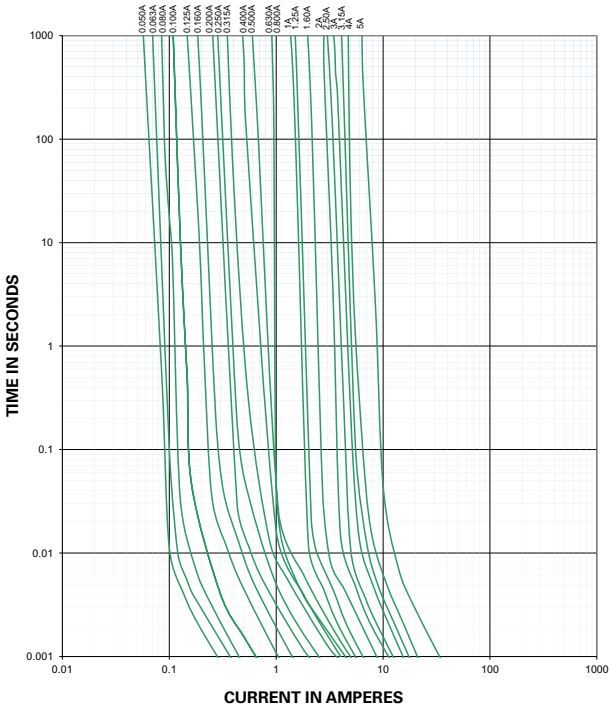
TR3 > Fast-Acting Fuse > 303 Series

Temperature Re-rating Curve

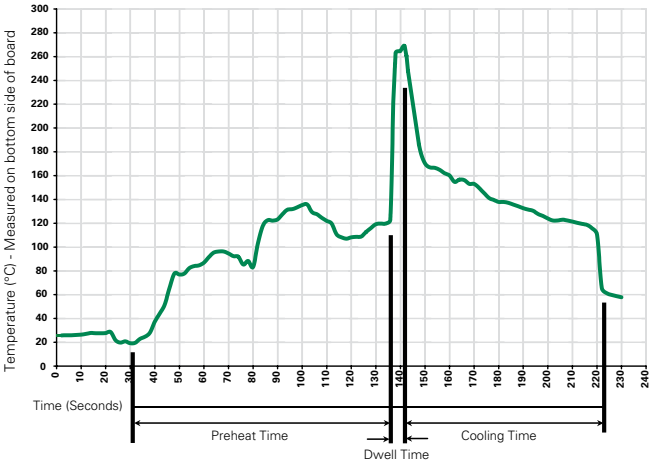


Note
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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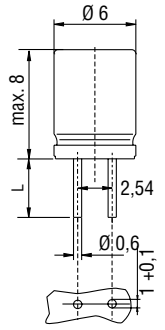
Product Characteristics

Materials	Base/Cap: Black Thermoplastic Base Polyamide PA 6.6, UL 94V-0 Brass, Nickel-plated Cap Round Pins: Copper alloy, Tin–plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-25°C to +70°C (consider de-rating)
Climatic Category	-25°C/+70°C/21 days (IEC 60068-1-3)
Stock Conditions	+10°C to +60°C RH, ≤75% yearly average, without dew
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10 g acceleration

Dimensions



Dimensions (mm)
Holes in PCB
Long Leads (L=18.8 mm)
Short Leads (L=4.3 mm)

Part Numbering System

303 xxxx 0001

Series

Amp. Code
Refer to Amp Code column of Electrical Characteristic Table

Packaging Code
0001 Tape/Ammopack (1,500 pcs.)
0131 Long Leads - Bulk (200 pcs.)
0421 Short Leads - Bulk (300 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
303 Series				
Tape & Ammopack	N/A	1,500	0001	N/A
Long Leads	N/A	200	0131	N/A
Short Leads	N/A	300	0421	N/A

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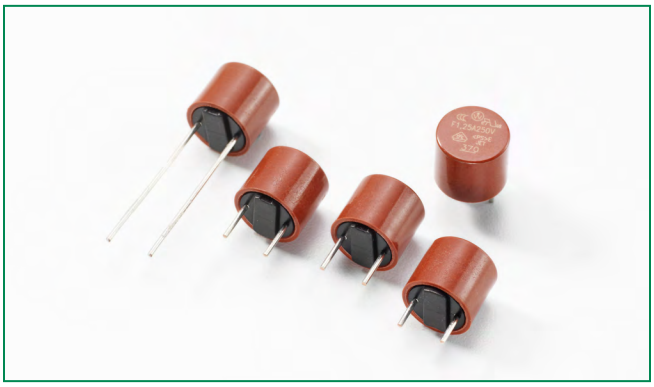
Revised: 03/03/17

370 Series, TR5 Fuse, Fast Acting



Description

The 370 Series are sub-miniature TR5® fuses, fast acting type, 250V rated fuses, designed in accordance to IEC 60127-3.

Features

- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Lead-free, Halogen free and RoHS compliant
- Available from 0.040A to 6.3A

Applications

- Battery Chargers
- Consumer Electronics
- Power supplies
- Industrial Controllers

Agency Approvals

Agency	Agency File Number	Ampere Range
	License number: 5007679-1170-0001/82438	0.100A - 5A
	License number: 5007679-1170-0001/97059 5007679-1170-0009/97069 5007679-1170-0002/82443	0.040A 0.050A - 0.080A 6.3A
	1506849	0.050A - 6.3A
	E67006	0.040A - 6.3A
	JET1896-31007-2002	1A - 5A
	2007010207240347	0.050A - 5A

Electrical Characteristics

% of Ampere Rating	Opening Time
150%	1 Hour, **Min.**
210%	30 Minutes, **Max.**
275%	10 ms, **Min.** ; 3 Sec., **Max.**
400%	3 ms, **Min.** ; 300 ms, **Max.**
1000%	20 ms, **Max.**

Additional Information

Datasheet | **Resources** | **Samples**

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Application testing is strongly recommended. Specifications are subject to change without notice.
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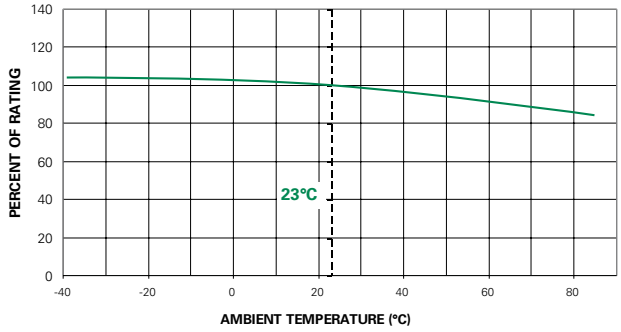
Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop $1.0\times I_N$ max. (mV)	Power Dissipation $1.5\times I_N$ max. (mW)	Melting Integral $10\times I_N$ max. (A^2s)	Agency Approvals				
0040	40mA	250V		6.0000	900	100	0.0002	X		X		
0050	50mA	250V		4.0224	320	80	0.0004	X	X	X		X
0063	63mA	250V		2.6740	350	100	0.0005	X	X	X		X
0080	80mA	250V		2.0000	370	120	0.0014	X	X	X		X
0100	100mA	250V		4.6100	600	130	0.0038	X	X	X		X
0125	125mA	250V		3.2400	550	172	0.0066	X	X	X		X
0160	160mA	250V		2.2520	500	165	0.0140	X	X	X		X
0200	200mA	250V		1.6900	465	190	0.0300	X	X	X		X
0250	250mA	250V		1.3420	400	250	0.0510	X	X	X		X
0315	315mA	250V	35A @	0.9300	380	250	0.1000	X	X	X		X
0400	400mA	250V	250VAC	0.1610	120	135	0.0250	X	X	X		X
0500	500mA	250V		0.1210	120	155	0.0420	X	X	X		X
0630	630mA	250V		0.0920	115	200	0.0760	X	X	X		X
0800	800mA	250V		0.0760	120	310	0.1200	X	X	X		X
1100	1.00A	250V		0.0676	110	310	0.2000	X	X	X	X	X
1125	1.25A	250V		0.0518	100	360	0.3100	X	X	X	X	X
1160	1.60A	250V		0.0420	100	600	0.5300	X	X	X	X	X
1200	2.00A	250V		0.0325	85	500	0.9800	X	X	X	X	X
1250	2.50A	250V		0.0246	80	660	1.8000	X	X	X	X	X
1315	3.15A	250V		0.0184	90	950	3.1000	X	X	X	X	X
1400	4.00A	250V	40A / 250VAC	0.0129	80	920	6.7000	X	X	X	X	X
1500	5.00A	250V	50A / 250VAC	0.0105	80	1000	12.0000	X	X	X	X	X
1630	6.30A*	250V	63A / 250VAC	0.0073	70	1200	24.0000	X	X	X		

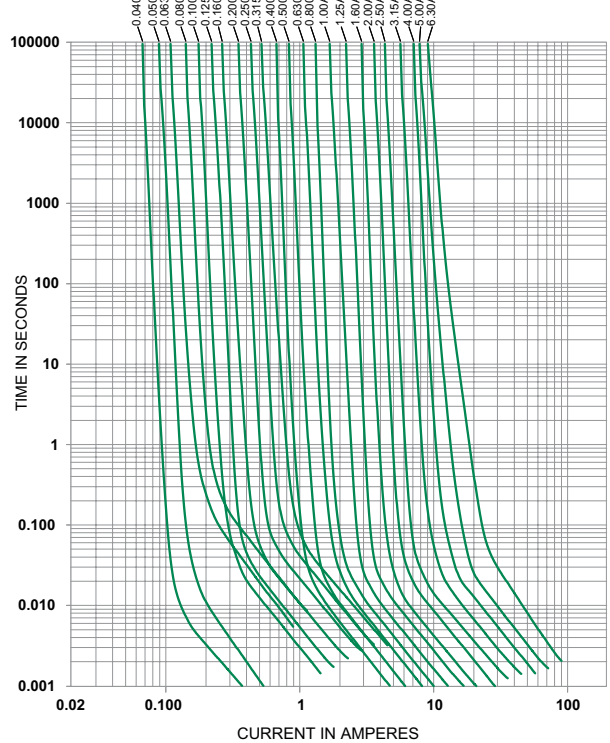
1 Per UL, approved breaking capacity is 50 A at 250 V.
* Conducting path min. 0.2 mm²
Notes:
1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.
2) Resistance is measured at 10% of rated current, 25ºC.

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



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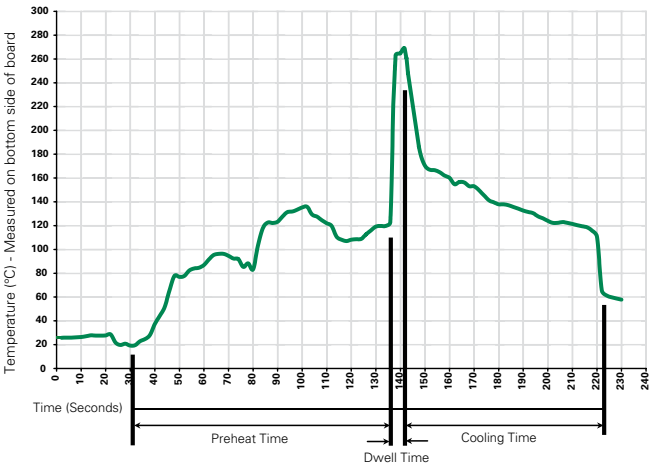
Radial Lead Fuses

TR5® > Fast-Acting Fuse > 370 Series

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 Seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 Seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

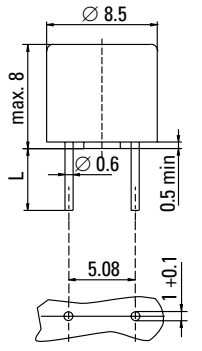
Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider de-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10G acceleration

Dimensions



Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Holes in PCB

Part Numbering System

370 xxxx 0000

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0000 Tape/Ammopack (1,000 pcs.)
0410 Short Leads - Bulk (1,000 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
370 Series				
Tape & Ammopack	N/A	1,000	0000	N/A
Short Leads	N/A	1,000	0410	N/A

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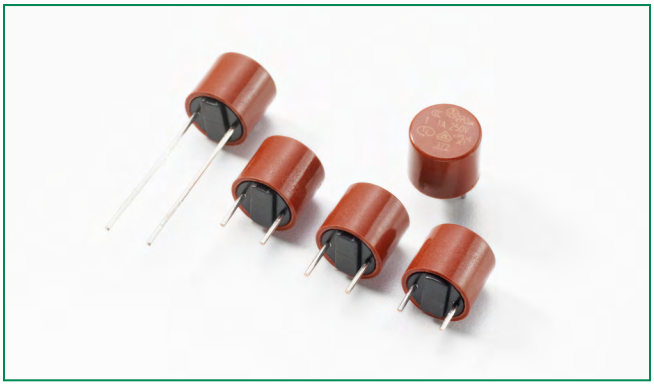
372 Series, TR5 Fuse, Time Lag



Description

The 372 Series are TR5® Fuses, Time-Lag type, 250V rated fuses, that are designed in accordance to IEC 60127-3.

Features

- Halogen free, Lead-free and RoHS compliant
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Available from 0.040A to 6.3A

Applications

- Battery Chargers
- Consumer electronics
- Power supplies
- Industrial Controllers

Agency Approvals

Agency	Agency File Number	Ampere Range
DVE	97187	0.050A - 4A
VDE	116448	5A - 6.3A
PSE	JET1896-31007-2002	1A - 5A
S	1410865	0.050A - 6.3A
c UL us	E67006	0.040A - 6.3A
KC	SU05024-7010 SU05024-7011 SU05024-7006 SU05024-7007 SU05024-7008 SU05024-7009 SU05024-7012	0.050 - 0.100A 0.125 - 0.800A 1A - 2.5A 3.15A 4A 5A 6.3A
CQC	CQC07012020855	5A - 6.3A
CCC	2007010207240346	0.040A - 4A

Electrical Characteristics

% of Ampere Rating	Opening Time
150%	1 Hour, **Min.**
210%	2 Minutes, **Max.**
275%	400 ms, **Min.** ; 10 Sec., **Max.**
400%	150 ms, **Min.** ; 3 Sec., **Max.**
1000%	20 ms, **Min.** ; 150 ms, **Max.**

Additional Information

Datasheet | **Resources** | **Samples**

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Revised: 03/03/17

Radial Lead Fuses

TR5® > Time-Lag Fuse > 372 Series

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0×I_N max. (mV)	Power Dissipation 1.5×I_N max. (mW)	Melting Integral 10×I_N min. (A^2s)	Agency Approvals					
								VDE		cULus	PSE		
0040	40mA	250V	35A@250VAC	10.1650	900	90	0.0090			X			
0050	50mA	250V		6.4950	500	70	0.0108	X	X	X		X	X
0063	63mA	250V		3.8000	400	80	0.0278	X	X	X		X	X
0080	80mA	250V		2.8750	370	100	0.0384	X	X	X		X	X
0100	100mA	250V		1.7030	300	110	0.0800	X	X	X		X	X
0125	125mA	250V		1.3500	260	120	0.1094	X	X	X		X	X
0160	160mA	250V		0.7780	200	130	0.1792	X	X	X		X	X
0200	200mA	250V		0.5750	170	140	0.3120	X	X	X		X	X
0250	250mA	250V		0.4000	150	150	0.4938	X	X	X		X	X
0315	315mA	250V		0.2760	140	160	0.3969	X	X	X		X	X
0400	400mA	250V		0.2050	130	170	1.4080	X	X	X		X	X
0500	500mA	250V		0.1550	125	180	2.0000	X	X	X		X	X
0630	630mA	250V		0.1150	120	200	3.0958	X	X	X		X	X
0800	800mA	250V		0.1000	110	220	5.7600	X	X	X		X	X
1100	1.00A	250V		0.0790	110	360	7.5000	X	X	X	X	X	X
1125	1.25A	250V		0.0550	95	450	13.7500	X	X	X	X	X	X
1160	1.60A	250V		0.0420	95	450	19.9680	X	X	X	X	X	X
1200	2.00A	250V		0.0300	85	600	30.0000	X	X	X	X	X	X
1250	2.50A	250V		0.0220	80	700	35.0000	X	X	X	X	X	X
1315	3.15A	250V		0.0173	80	1100	77.3955	X	X	X	X	X	X
1400	4.00A	250V	40A / 250 VAC	0.0129	75	1200	126.4000	X	X	X	X	X	X
1500	5.00A	250V	50A / 250 VAC	0.0094	80	1300	115.0000	X	X	X	X	CQC	X
1630	6.30A*	250V		0.0070	58	1250	138.9150	X	X	X		CQC	X

1 Per UL, approved breaking capacity is 50 A at 250 V.

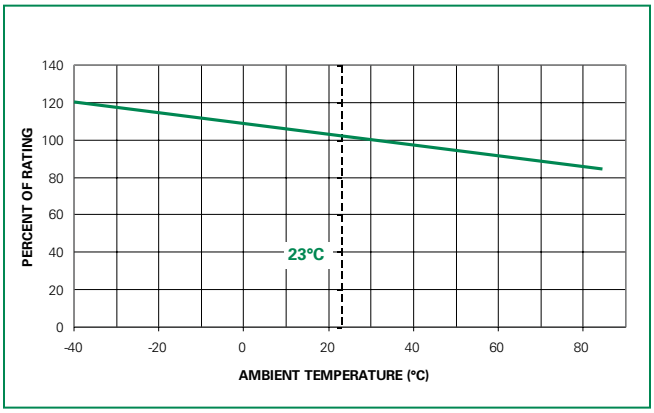
* Conducting path min. 0.2 mm²

Notes:

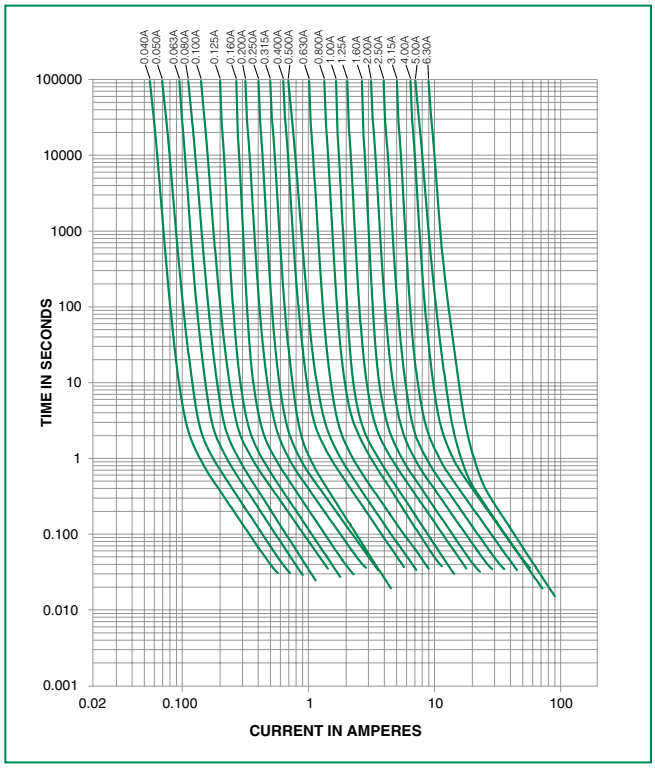
1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

2) Resistance is measured at 10% of rated current, 25°C.

Temperature Re-rating Curve



Average Time Current Curves



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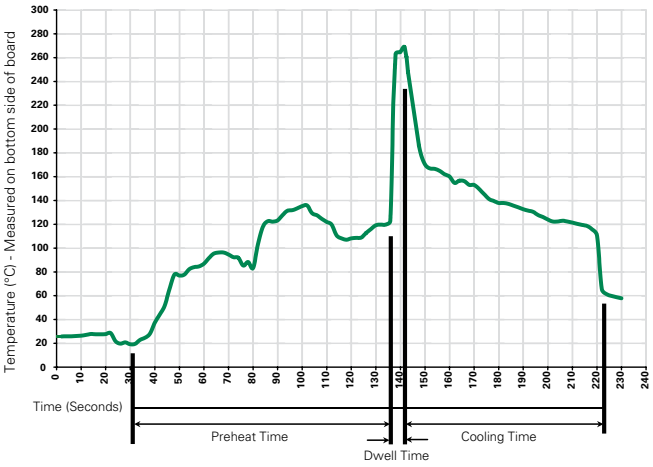
Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

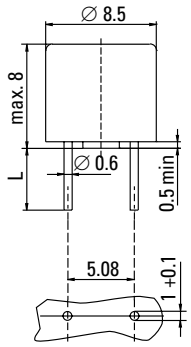
Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)
Operating Temperature	-40°C to +85°C (Consider re-rating)
Climatic Category	-40°C/+85°C/21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10G's acceleration

Dimensions



Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
372 Series				
Tape & Ammopack	N/A	1,000	0001	N/A
Short Leads	N/A	1,000	0411	N/A
Short Leads	N/A	200	0431	N/A
3.3mm Leads	N/A	1,000	0511	N/A

Part Numbering System

372 xxxx 0001

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0001 Tape/Ammopack (1,000 pcs.)
0411 Short Leads - Bulk (1,000 pcs.)
0431 Short Leads - Bulk (200 pcs.)
0511 3.3 mm Leads - Bulk (1000 pcs.)

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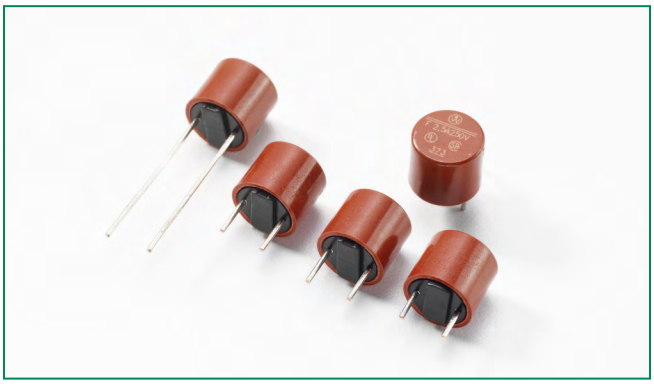
Revised: 03/03/17

373 Series, TR5 Fuse, Fast Acting



Description

The TR5® 373 Series fuses are fast–acting 250V rated and designed in accordance to UL 248–14.

Features

- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Lead-free, Halogen free and RoHS compliant
- Available from 0.050A to 10A

Agency Approvals

Agency	Agency File Number	Ampere Range
	51378	0.050A - 6.3A
	E67006	0.050A - 10A

Applications

- Battery Chargers
- Consumer Electronics
- Power supplies
- Industrial Controllers

Electrical Characteristics

% of Ampere Rating	Ampere Rating	Opening Time
200%	50mA - 6.3A	5 Seconds, **Max.**
	8A - 10A	60 Seconds, **Max.**

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0xI_N max. (mV)	Power Dissipation 1.0xI_N max. (mW)	Melting Integral 10xI_N max. (A^2s)	Agency Approvals	
0050	50mA	250V	50A@250VAC	7.6250	1400	70	0.0001	X	X
0063	63mA	250V		4.6900	1300	85	0.0002	X	X
0080	80mA	250V		3.6500	1200	100	0.0004	X	X
0100	100mA	250V		8.9000	1100	110	0.0013	X	X
0125	125mA	250V		6.0550	1000	125	0.0019	X	X
0160	160mA	250V		4.1310	950	155	0.0040	X	X
0200	200mA	250V		3.2260	850	170	0.0065	X	X
0250	250mA	250V		2.2240	750	190	0.0140	X	X
0315	315mA	250V		1.5150	650	205	0.0320	X	X
0400	400mA	250V		0.2200	230	95	0.0160	X	X
0500	500mA	250V		0.1570	220	110	0.0250	X	X
0630	630mA	250V		0.1180	210	135	0.0450	X	X
0800	800mA	250V		0.0970	200	160	0.0690	X	X
1100	1.00A	250V		0.0710	190	190	0.1250	X	X
1125	1.25A	250V		0.0665	180	225	0.2000	X	X
1160	1.60A	250V		0.0480	170	275	0.3800	X	X
1200	2.00A	250V		0.0359	160	320	0.6300	X	X
1250	2.50A	250V		0.0305	150	375	1.2000	X	X
1315	3.15A	250V		0.0240	140	445	1.9000	X	X
1400	4.00A	250V		0.0185	130	520	3.5000	X	X
1500	5.00A	250V		0.0144	120	630	6.2000	X	X
1630	6.30A	250V		0.0133	115	1000	9.1000	X	X
1800	8.00A[1]	250V		0.0074	120	1600	30.0000		X
2100	10.00A[1]	250V		0.0059	110	2000	55.0000		X

1 Conducting path cross-section minimum ≥ 0.2mm²

Notes:

1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

2) Resistance is measured at 10% of rated current, 25°C.

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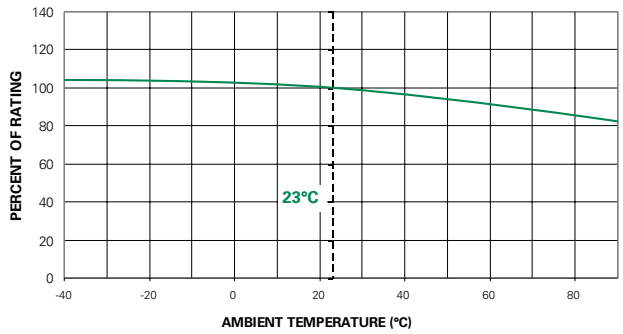
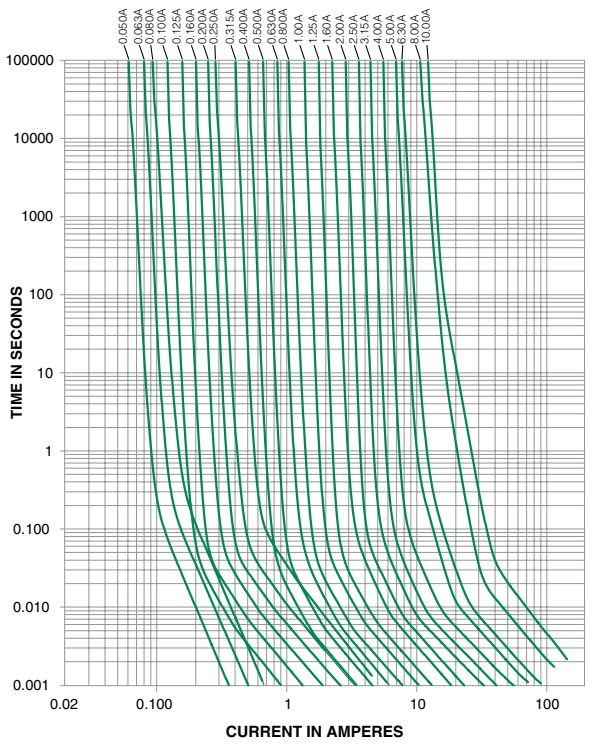
Temperature Re-rating Curve

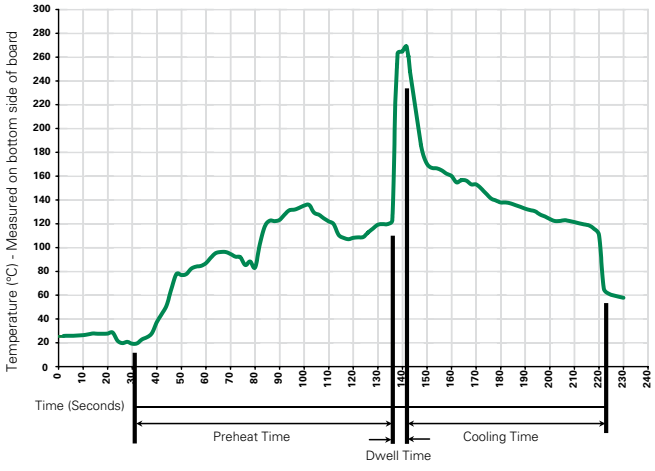


Note
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Radial Lead Fuses

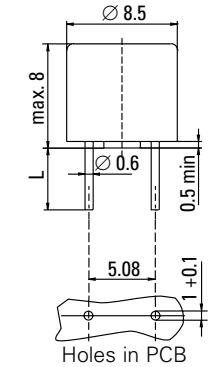
TR5® > Fast-Acting Fuse > 373 Series

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider de-rating)
Climatic Category	-40°C/+85°C/21 days (EN 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10G's acceleration

Dimensions



Holes in PCB
Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Part Numbering System

373 xxxx 0000

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0000 Tape/Ammopack (1,000 pcs.)
0410 Short Leads - Bulk (1,000 pcs.)
0430 Short Leads - Bulk (200 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
373 Series				
Tape & Ammopack	N/A	1,000	0000	N/A
Short Leads	N/A	1,000	0410	N/A
Short Leads	N/A	200	0430	N/A

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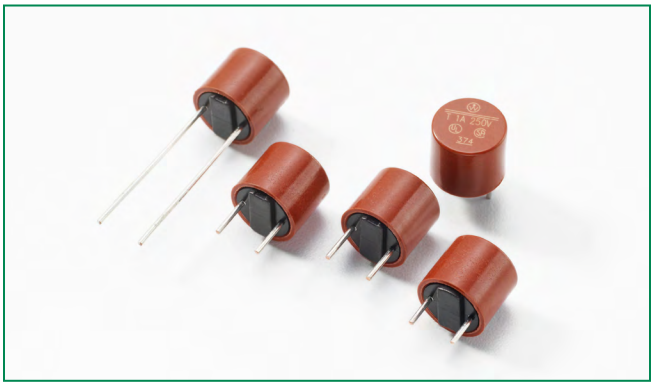
374 Series, TR5 Fuse, Time Lag



Agency Approvals

Agency	Agency File Number	Ampere Range
CSA	51378	0.050A - 6.3A
cULus	E67006	0.050A - 10A

Description

The TR5® 374 Series fuses are Time–Lag 250V rated and designed in accordance to UL 248–14.

Features

- Halogen free, Lead-free and RoHS compliant
- Reduced PCB space requirements
- Direct solderable or plug–in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Available from 0.050A to 10A

Applications

- Battery Chargers
- Consumer Electronics
- Power supplies
- Industrial Controllers

Electrical Characteristics

% of Ampere Rating	Opening Time
200%	60 Seconds,

Additional Information

Datasheet | **Resources** | **Samples**

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Revised: 03/03/17

Radial Lead Fuses

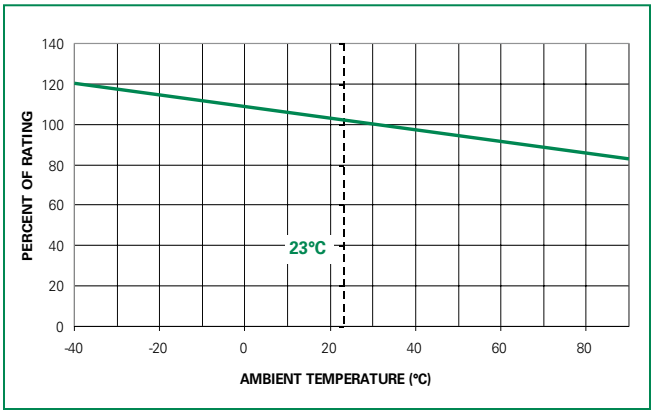
TR5® > Time-Lag Fuse > 374 Series

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop $1.0\times I_N$ max. (mV)	Power Dissipation $1.0\times I_N$ max. (mW)	Melting Integral $10\times I_N$ min. (A^2s)	Agency Approvals	
								SP®	cULus
0050	50mA	250V	50A@250VAC	12.5000	900	45	0.011	x	x
0063	63mA	250V		7.9200	800	50	0.015	x	x
0080	80mA	250V		5.8500	700	55	0.025	x	x
0100	100mA	250V		3.8400	600	60	0.039	x	x
0125	125mA	250V		2.9000	550	70	0.052	x	x
0160	160mA	250V		1.8300	480	80	0.083	x	x
0200	200mA	250V		1.2000	390	80	0.146	x	x
0250	250mA	250V		0.7600	350	90	0.313	x	x
0315	315mA	250V		0.5450	300	95	0.298	x	x
0400	400mA	250V		0.3510	250	100	0.552	x	x
0500	500mA	250V		0.2600	220	110	0.875	x	x
0630	630mA	250V		0.1700	210	135	1.191	x	x
0800	800mA	250V		0.1250	160	130	2.112	x	x
1100	1.00A	250V		0.1050	155	155	3.100	x	x
1125	1.25A	250V		0.0800	145	185	4.453	x	x
1160	1.60A	250V		0.0540	130	210	6.272	x	x
1200	2.00A	250V		0.0395	125	250	11.800	x	x
1250	2.50A	250V		0.0300	120	300	18.125	x	x
1315	3.15A	250V		0.0227	110	350	29.966	x	x
1400	4.00A	250V		0.0170	100	400	56.000	x	x
1500	5.00A	250V		0.0122	95	475	87.500	x	x
1630	6.30A	250V		0.0094	90	570	144.869	x	x
1800	8.00A	250V		0.0060	80	1000	220.800		x
2100	10.00A	250V		0.0050	90	1250	430.000		x

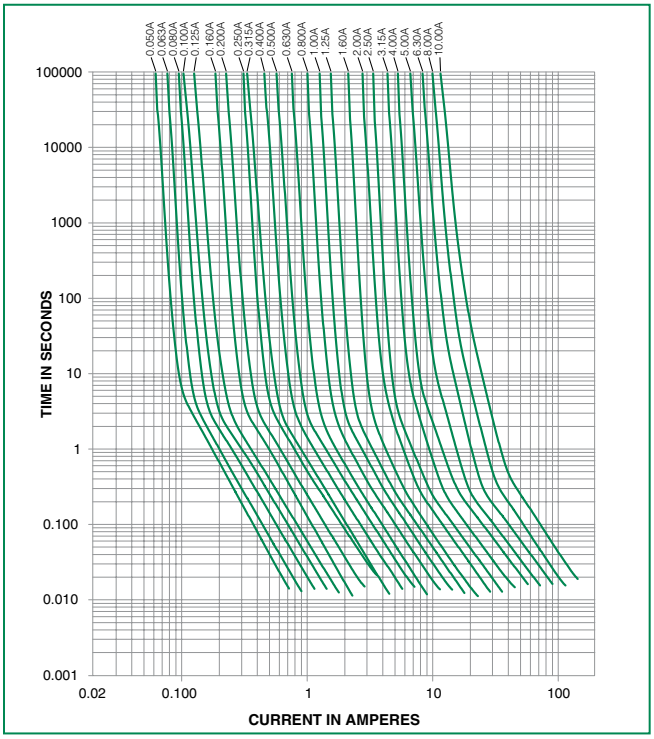
Notes:
1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.
2) Resistance is measured at 10% of rated current, 25ºC.

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



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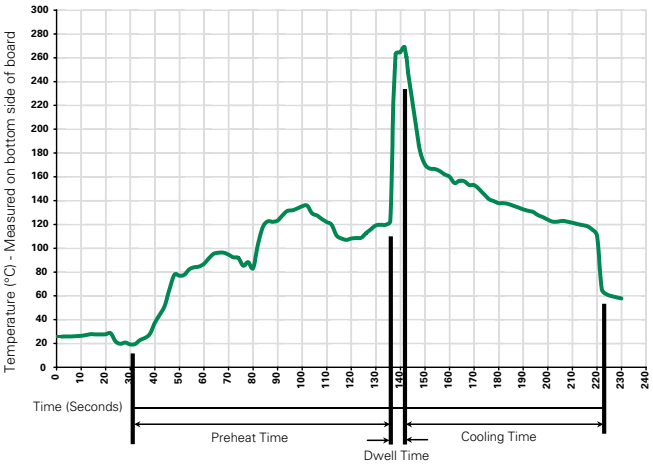
Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

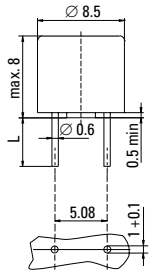
Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider de-rating)
Climatic Category	-40°C/+85°C/21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10G's acceleration

Dimensions



Holes in PCB
Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Part Numbering System

374 xxxx 0000

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0000 Tape/Ammopack (1,000 pcs.)
0410 Short Leads - Bulk (1,000 pcs.)
0430 Short Leads - Bulk (200 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
374 Series				
Tape & Ammopack	N/A	1,000	0000	N/A
Short Leads	N/A	1,000	0410	N/A
Short Leads	N/A	200	0430	N/A

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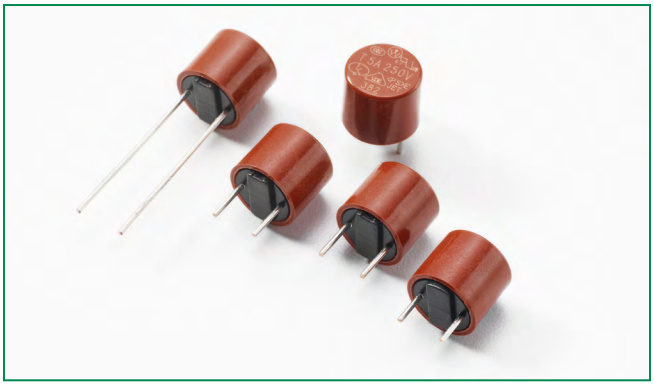
Revised: 03/03/17

382 Series, TR5® Fuse, Time-Lag



Agency Approvals

Agency	Agency File Number	Ampere Range
	40018249	1A - 4A
	40018250	5A - 6.3A
	1609346	1A - 6.3A
	E67006	1A - 10A
	JET1896-31007-2001 JET1896-31007-1006	1 - 5A 6.3 - 10A
	2007010207240344	1A - 4A
	CQC07012020713	5A - 6.3A
	SU05024-7003 SU05024-7002 SU05024-7001 SU05024-7004 SU05024-7005	1-2.5A 3.15A 4A 5A 6.3A

Description

The 382 Series are TE5 Time-Lag type Fuses, 250V rated, with enhanced breaking capacity and designed in accordance to IEC 60127-3.

Features

- Halogen free, Lead-free and RoHS compliant
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- 100A breaking capacity
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Available from 1A to 10A

Applications

- Battery Chargers
- Consumer Electronics
- Power supplies
- Industrial Controllers

Electrical Characteristics

% of Ampere Rating	Opening Time	
	1A - 6.3A	8A - 10A
150%	1 Hour, **Min.**	1 Hour, **Min.**
210%	2 Minutes, **Max.**	300 s, **Max.**
275%	400 ms, **Min.** ; 10 Sec., **Max.**	1 s, **Min.** ; 20 s, **Max.**
400%	150 ms, **Min.** ; 3 Sec., **Max.**	150 ms, **Min.** ; 3 Sec., **Max.**
1000%	20 ms, **Min.** ; 150 ms, **Max.**	20 ms, **Min.** ; 150 ms, **Max.**

Additional Information

Datasheet | **Resources** | **Samples**

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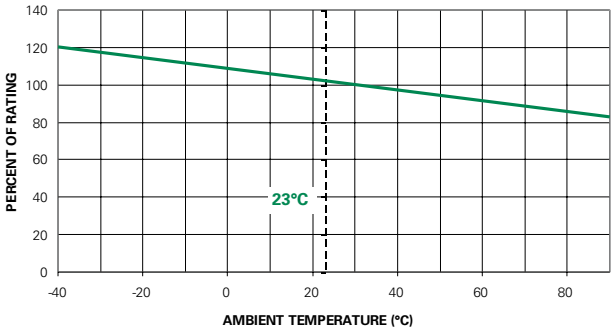
Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop $1.0 \times I_N$ max. (mV)	Power Dissipation $1.5 \times I_N$ max. (mW)	Melting Integral $10 \times I_N$ min. (A^2s)	Agency Approvals					
1100	1.00 A	250 V	100A @250VAC	0.0625	100	400	4.85	X	X	X	X	X	X
1125	1.25 A	250 V		0.0500	95	465	6.88	X	X	X	X	X	X
1160	1.60 A	250 V		0.0377	90	490	12.67	X	X	X	X	X	X
1200	2.00 A	250 V		0.0280	85	670	17.80	X	X	X	X	X	X
1250	2.50 A	250 V		0.0215	80	750	29.69	X	X	X	X	X	X
1315	3.15 A	250 V		0.0176	75	900	45.35	X	X	X	X	X	X
1400	4.00 A	250 V		0.0138	70	1200	72.00	X	X	X	X	X	X
1500	5.00 A	250 V		0.0108	65	1250	121.25	X	X	X	X	CQC	X
1630	6.30 A	250 V		0.0076	65	1400	148.84	X	X	X	X	CQC	X
1800	8.00 A	250 V		0.0059	63	1600	233.60			X	X		
2100	10.00 A	250 V		0.0042	57	1600	365.00			X	X		

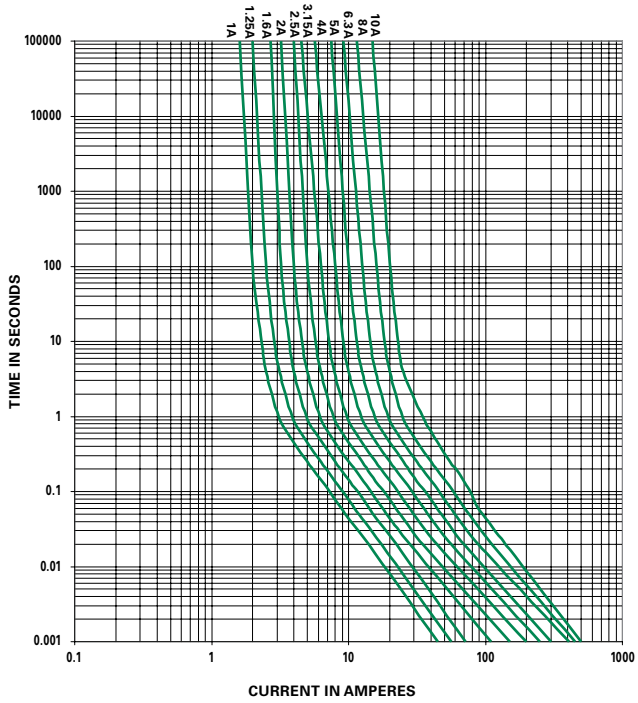
Notes:
1. 1.00 means the number one with two decimal places. 1,000 means the number one thousand.
2. Resistance is measured at 10% of rated current, 25°C.

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



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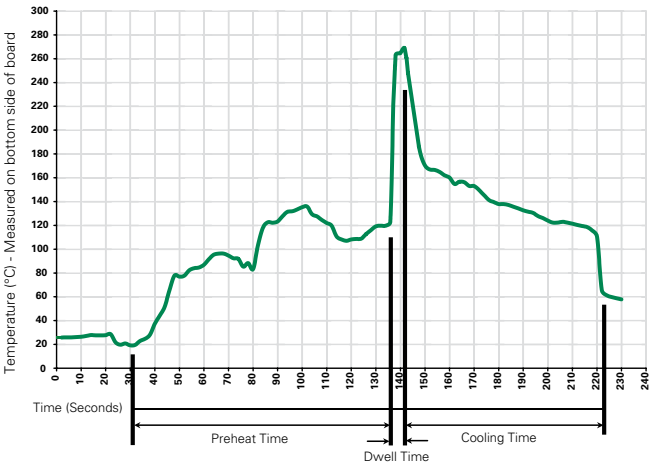
Revised: 03/03/17

Radial Lead Fuses

TR5® > Time-Lag Fuse > 382 Series

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

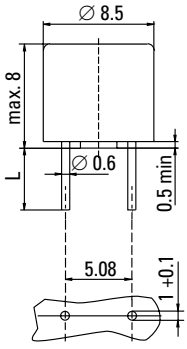
Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider re-rating)
Climatic Category	-40°C to +85°C /21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH ≤ 75% yearly average, without dew, maximum value for 30 days–95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10 g acceleration

Dimensions



Holes in PCB

Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Part Numbering System

382 xxxx 0000

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0000 Tape/Ammopack (1,000 pcs.)
0410 Short Leads - Bulk (1,000 pcs.)
0430 Short Leads - Bulk (200 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
382 Series				
Tape & Ammopack	N/A	1,000	0000	N/A
Short Leads	N/A	1,000	0410	N/A
Short Leads	N/A	200	0430	N/A

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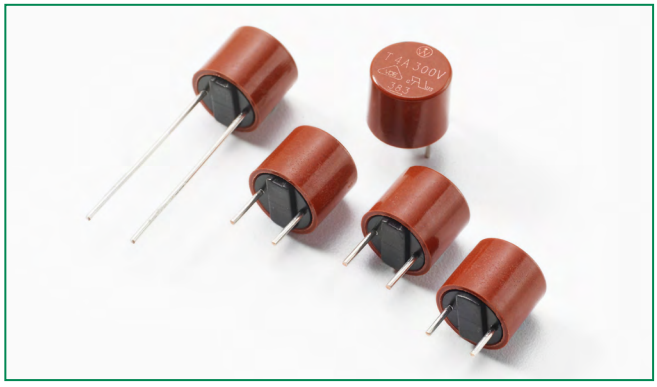
Revised: 03/03/17

383 Series, TR5® Time-Lag Fuse



Description

The 383 series are TR5® time-lag 300V rated fuses and designed in accordance to IEC60127-3.

Features

- Halogen free, Lead-free and RoHS compliant
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant

Applications

- Electronic Ballast

Agency Approvals

Agency	Agency File Number	Ampere Range
VDE	40022712	4A - 5A
PS E	JET1896-31007-2001 JET1896-31007-1006	1A - 5A 6.3A - 10A
c UL us	E67006	1A - 10A

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics for Series

% of Ampere Rating	Opening Time	
	1A - 6.3A	8A - 10A
150%	1 Hour, **Min.**	1 Hour, **Min.**
210%	2 Minutes, **Max.**	300 s, **Max.**
275%	400 ms, **Min.**; 10 s, **Max.**	1 s, **Min.**; 20 s, **Max.**
400%	150 ms, **Min.**; 3 s, **Max.**	150 ms, **Min.**; 3 s, **Max.**
1000%	20 ms, **Min.** ; 150 ms, **Max.**	20 ms, **Min.** ; 150 ms, **Max.**

Electrical Characteristics Specifications by Item

Amp Code	Rated Current	Max Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0xI_N max. (mV)	Power Dissipation 1.5xI_N max. (mW)	Melting Integral 10xI_N max. (A^2s)	Agency Approvals		
								VDE	PS E	c UL us
1100	1.00 A	300 V	100A@300VAC 50A@320VAC	0.0625	100	400	4.85		X	X
1125	1.25 A	300 V		0.0500	95	465	6.88		X	X
1160	1.60 A	300 V		0.0377	90	490	12.67		X	X
1200	2.00 A	300 V		0.0280	85	670	17.80		X	X
1250	2.50 A	300 V		0.0215	80	750	29.69		X	X
1315	3.15 A	300 V		0.0176	75	900	45.35		X	X
1400	4.00 A	300 V		0.0138	70	1200	72.00	X	X	X
1500	5.00 A	300 V	50A@320VAC 100A@250VAC	0.0108	65	1250	121.25	X	X	X
1630	6.30 A	300 V		0.0076	65	1400	148.84		X	X
1800	8.00 A	300 V		0.0059	63	1600	233.60		X	X
2100	10.00 A	300 V		0.0042	57	1600	365.00		X	X

Note: 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

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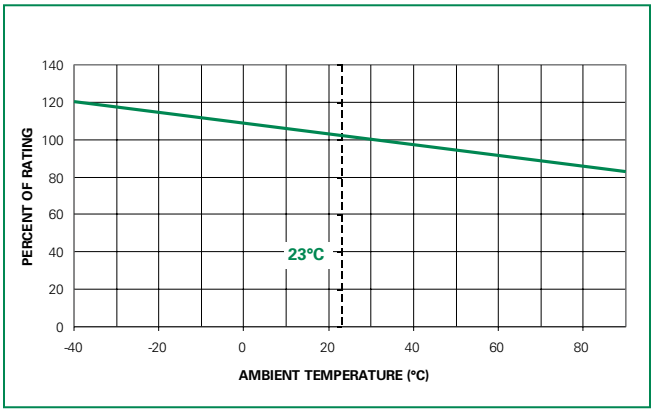
Radial Lead Fuses

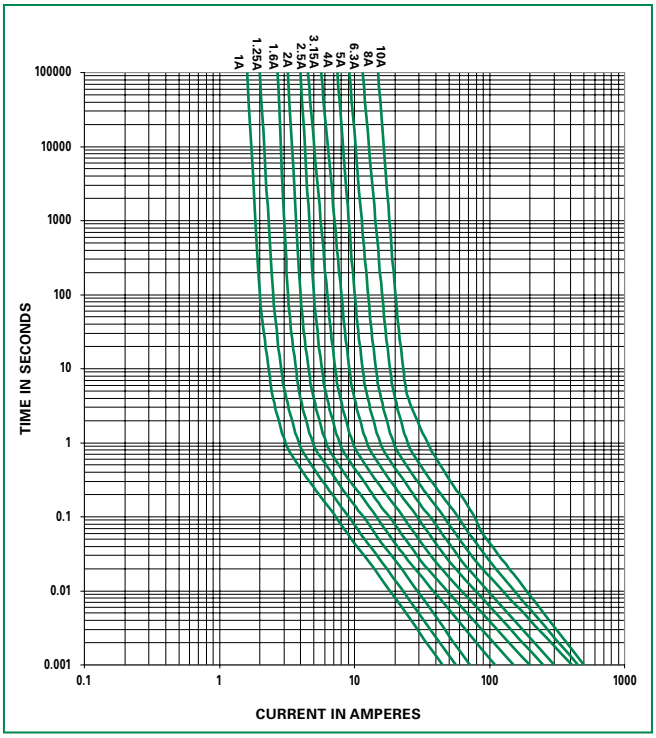
TR5® > Time-Lag Fuse > 383 Series

Temperature Re-rating Curve

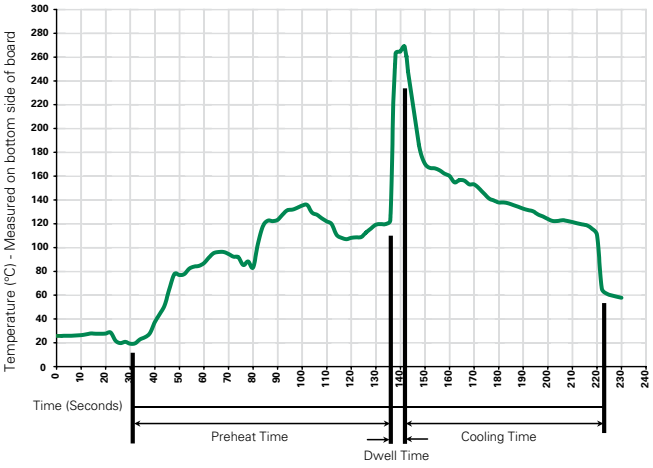


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Radial Lead Fuses

TR5® > Time-Lag Fuse > 383 Series

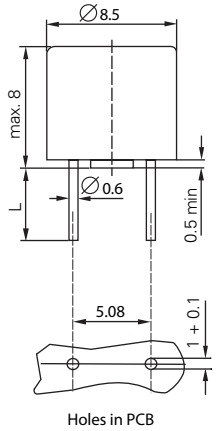
Littelfuse
Expertise Applied | Answers Delivered

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider re-rating)
Climatic Category	-40°C to +85°C /21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH ≤ 75% yearly average, without dew, maximum value for 30 days–95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10 g acceleration

Dimensions



Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Part Numbering System

383 xxxx 0000

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0000 Tape/Ammopack (1,000pcs.)
0410 Short Leads - Bulk (1,000pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
383 Series				
Tape & Ammopack	N/A	1,000	0000	N/A
Short Leads	N/A	1,000	0410	N/A

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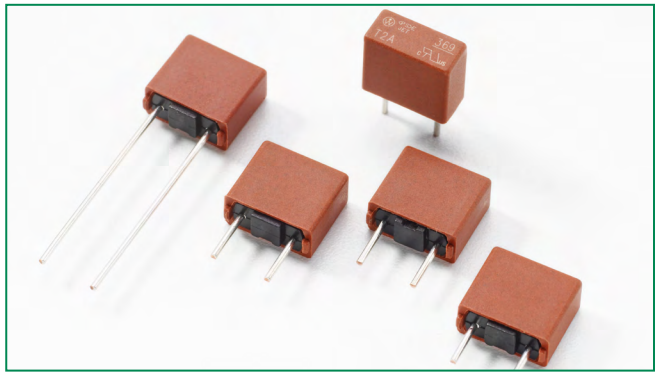
369 Series, TE5® Time-Lag Fuse



Description

The 369 Series are TE5® Time-Lag Fuses, 300V rated and designed in accordance to IEC 60127-3.

Features

- Halogen free, Lead-free and RoHS compliant
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant

Applications

- Electronic Ballast

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E67006	0.800A - 6.3A
PS E	JET 1896-31007-2002	1A - 5A
S	1605793	1A - 6.3A
VDE	40037351	1A, 1.6A - 2A, 3.15A - 6.3A

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

% of Ampere Rating	Opening Time
150%	1 Hour, Minimum
210%	120 sec., Maximum
275%	400 ms., Min.; 10 sec., Max.
400%	150 ms., Min.;, 3 sec., Max.
1000%	20 ms., Min.; 150 ms., Max.

Electrical Characteristics

Amp Code	Amp Rating (A)	Voltage Rating (V)	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0 x I_N max. (mV)	Power Dissipation 1.5 x I_N max. (mW)	Melting Integral 10 x I_N max. (A^2s)	Agency Approvals			
								c UL us	PS E	S	VDE
0800	0.800	300	50A @300VAC	0.0960	110	280	5.1200	x			
1100	1.00	300		0.0715	115	400	8.0000	x	x	x	x
1160	1.60	300		0.0400	95	600	18.4320	x	x	x	x
1200	2.00	300		0.0298	90	700	29.0000	x	x	x	x
1315	3.15	300		0.0170	80	1100	78.3880	x	x	x	x
1400	4.00	300		0.0128	75	1200	126.4000	x	x	x	x
1500	5.00	300		0.0101	70	1000	106.2500	x	x	x	x
1630	6.30	300		0.0077	65	1200	160.7400	x		x	x

Note:
1. Resistance is measured at 10% of rated current, 25°C.

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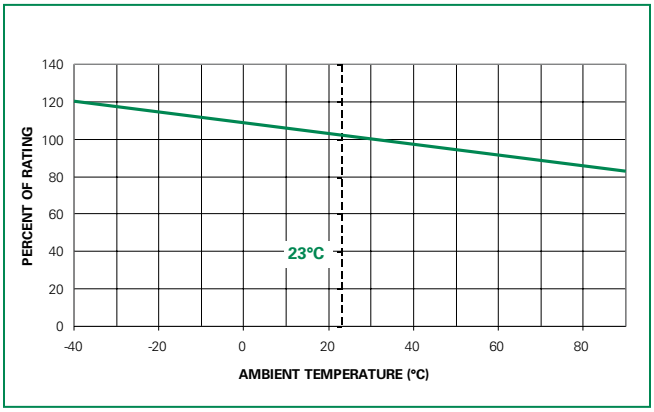
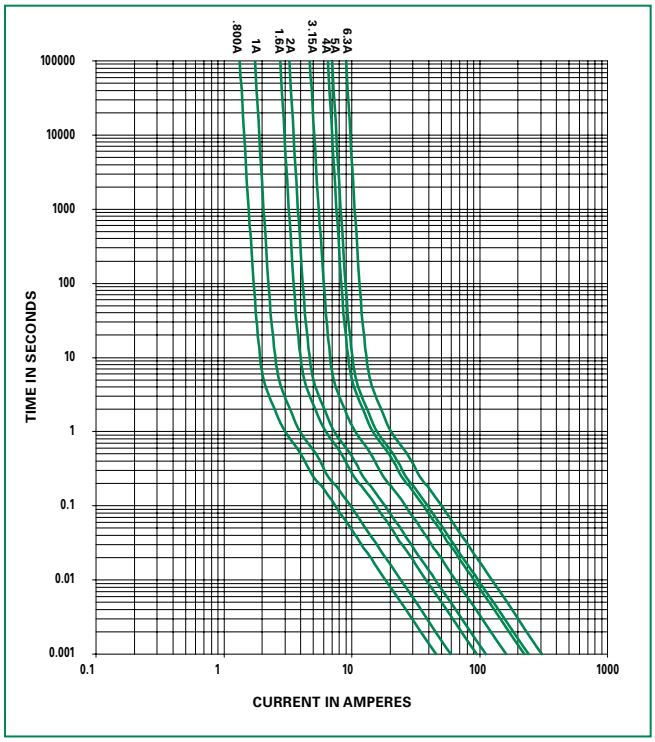
Temperature Re-rating Curve

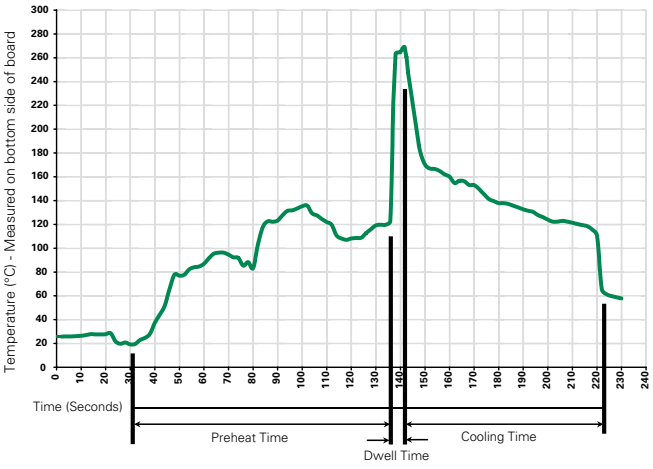


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Radial Lead Fuses

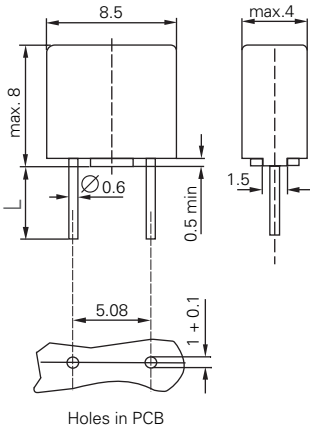
TE5® > Time-Lag Fuse > 369 Series

Product Characteristics

Materials	Base/Cap: Black/Brown Thermoplastic Polyamide PA 6.6, UL 94 V0 Round Pins: Tin-plated Copper
Lead Pull Strength	10N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider re-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH, ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration

Dimensions



Holes in PCB

Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Part Numbering System

369 xxxx 0000

Series

Amp Code

Refer to Amp Code column of Electrical Characteristics Table

Packaging Code

0000 Tape/Ammopack (1,400pcs.)
0440 Short Leads - Bulk (1,400pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
369 Series				
Tape & Ammopack	N/A	1,400	0000	N/A
Short Leads	N/A	1,400	0440	N/A

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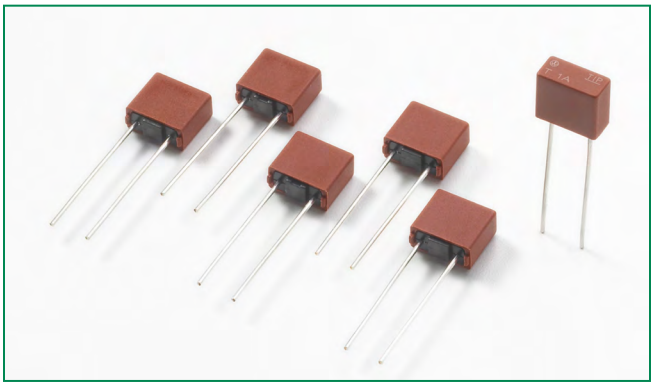
385 Series, TE5® Telecom Interface Protector Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E67006	0.350A - 1.5A

Additional Information

Datasheet | **Resources** | **Samples**

Description

The 385 Series TE5R Telecom Interface Protector Fuses are 125V rated, Time-Lag type and designed in accordance to UL 248-14.

Features

- Surge proof for telecom applications
- Reduced PCB space requirements
- Highly defined cut-off times
- Low internal resistance
- Irreversible physical separation
- Flame resistant encapsulated casing
- Available from 0.350A to 1.5A

Applications

- Battery chargers
- Consumer Electronics
- Telecom
- Power supplies
- Industrial controllers

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	2 Hours,
300%	300 ms., Min.; 5 sec., Max.

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0×I_N max. (mV)	Power Disspation 1.0×I_N max. (mW)	Melting Integral 10×I_N max. (A^2s)	Surge Amplitude (A)[1]			Agency Approvals
								FCC	Bellcore	ITU	c UL us
0350	350mA	125V	50A @125VAC	0.4320	250	90	0.78	32	19	36	x
0500	500mA	125V		0.2570	220	110	1.81	48	26	61	x
0800	800mA	125V		0.1290	170	130	4.35	80	42	67	x
1100	1.00A	125V		0.0830	140	130	6.75	100	52	67	x
1125	1.25A	125V		0.0610	125	140	9.84	128	65	67	x
1150	1.50A	125V		0.0495	120	170	11.52	155	78	67	x

[1] FCC 47 Part 68: Minimum pulse load quantity is 2 pulses at a test generator output of 800V and 10x560µs waveform.
ITU-T K.20: Minimum pulse load quantity is 30 pulses at a test generator output of 1000V, 67A and 10x700µs waveform.
Bellcore GR-1089: Minimum pulse load quantity is 50 pulses at a test generator output of 1000V and 10x1000µs.

Note: 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

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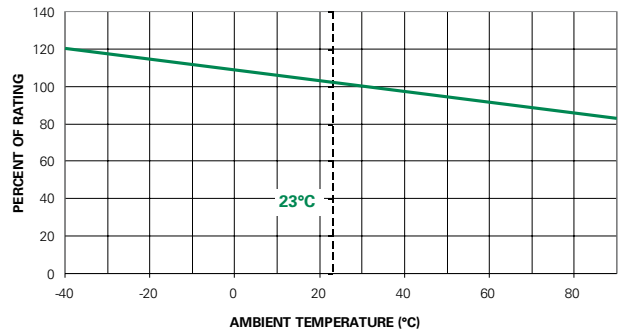
Revised: 03/03/17

Radial Lead Fuses

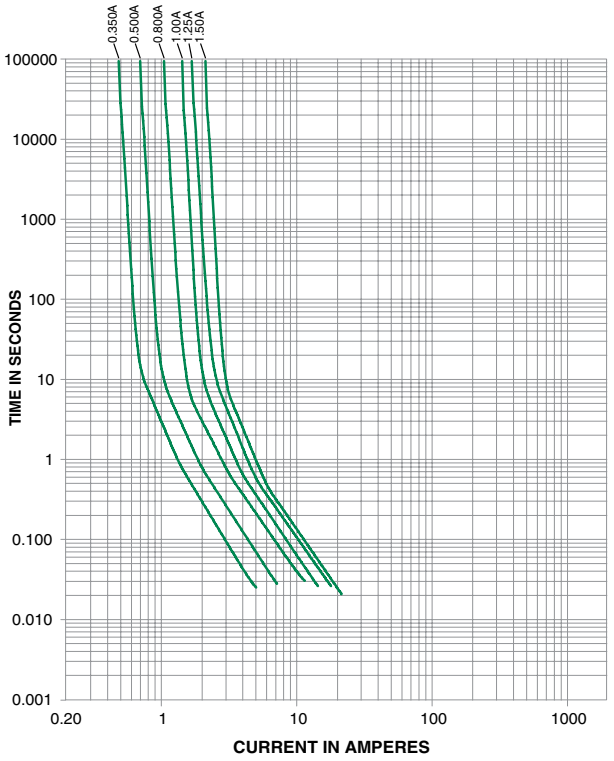
TE5® > Transient Tolerant Fuse > 385 Series

Temperature Re-rating Curve

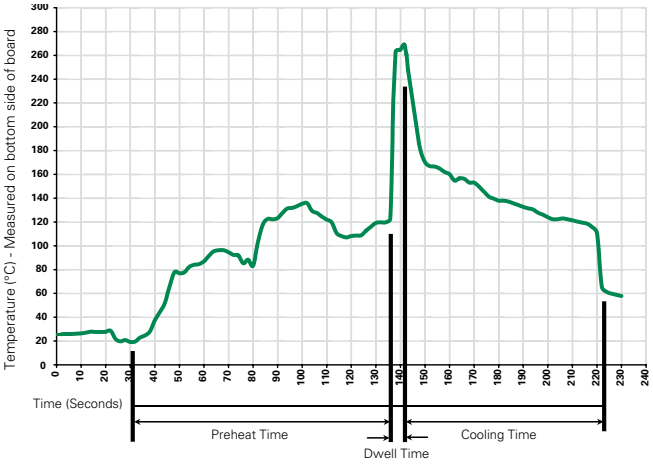


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

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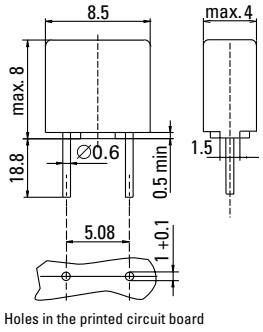
Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider re-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH, ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration

Dimensions



Dimensions (mm)
Long Leads (L=18.8mm)

Part Numbering System

385 xxxx 0000

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0000 Tape/Ammopack (1,400 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
385 Series				
Tape & Ammopack	N/A	1,400	0000	N/A

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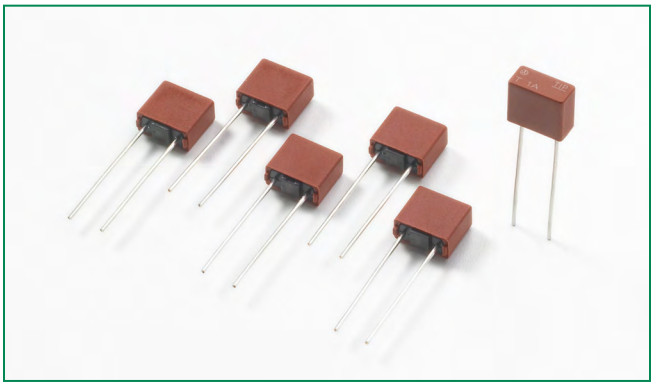
389 Series, TE5®, Slow-Blo



Description

The 389 Series is a TE5, Slow-Blo type fuse designed for overcurrent protection of sensitive electronic components and assemblies.

Features

- For worldwide applications
- Reduced PCB space requirements
- Highly defined cut-off times
- Low internal resistance
- Flame resistant encapsulated casing
- RoHS compliant and Lead-free
- Available in 0.060A only

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E67006	0.060A

Applications

- Telecom equipment
- Data processing equipment
- Input/output modules
- Household appliances
- Medical equipment

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

% of Ampere Rating	Opening Time
166	600 sec, **Min.**
250	45 sec, **Max.**

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Cold Resistance 0.1In (mΩ)	Power Dissipation (mW)	Melting Integral 10In (A^2s)
0060	60mA	250 VAC	10A@250VAC	6080	100	0.033

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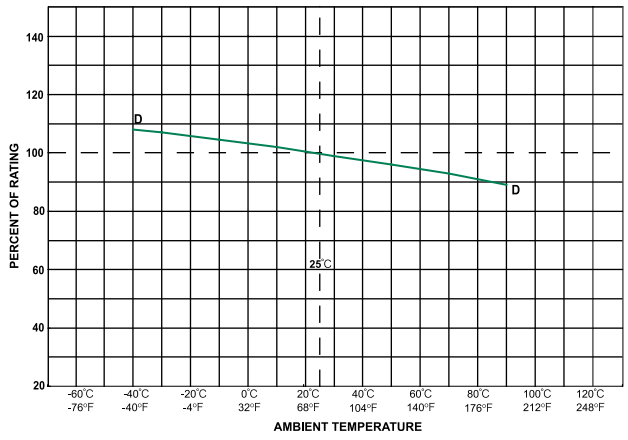
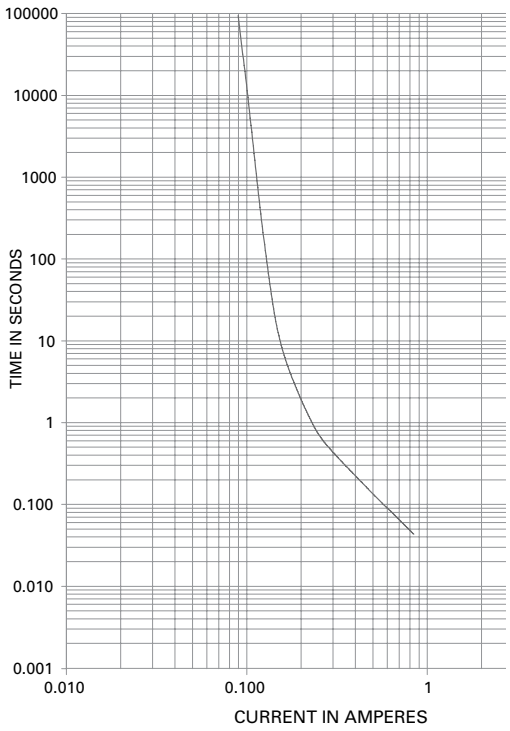
Temperature Re-rating Curve

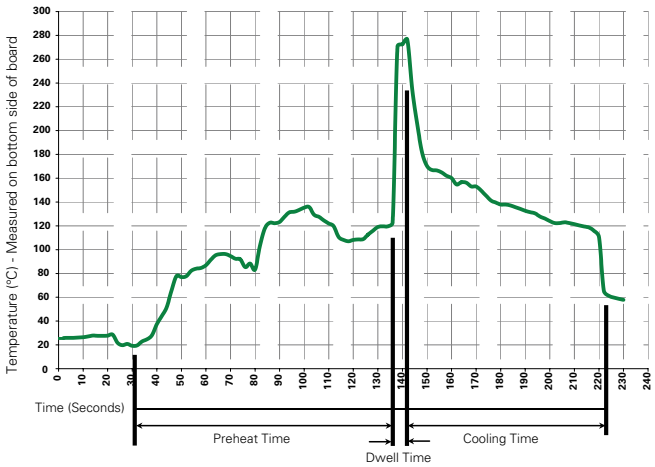


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60–180 seconds
Solder Pot Temperature:	280°C Maximum
Solder Dwell Time:	2–5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C ± 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

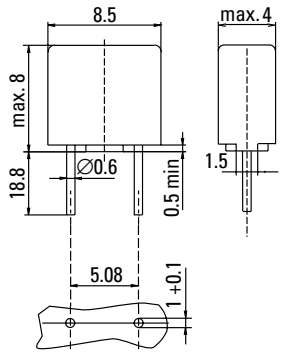
TE5® > Slow-Blo Fuse > 389 Series

Product Characteristics

Materials	Base/Cap: Black/Brown Thermoplastic Polyamide PA 6.6, UL 94V-0 Round Pins: Copper, Tin–plated
Lead Pull Strength	10N (IEC 60068-2-21)
Solderability	260°C, ≤ 3 sec. (Wave) 350°C, ≤ 1 sec. (Hand)
Soldering Heat Resistance	260°C, 10 sec. (IEC 60068-2-20)

Operating Temperature	–40°C to +85°C (consider de-rating)
Climatic Category	–25°C/+70°C/21 days (IEC 60068-1..3)
Stock Conditions	+10°C to +60°C RH, ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration

Dimensions



Holes in PCB

Part Numbering System

389 0060 000

- 000 — Packaging Code
  - 000 Tape/Ammopack (1,400 pcs.)
- 0060 — Amp. Code
  - (See Electrical Characteristics Chart)
- 389 — Series

Packaging

Packaging Code	Packing Option	Quantity
000	Tape/Ammopack	1400

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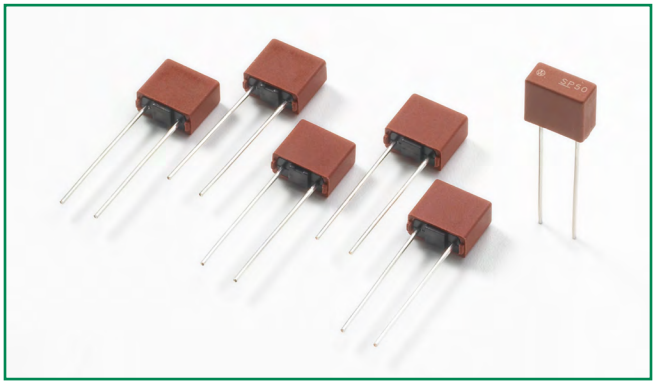
391 Series, TE5® Fast-Acting Fuse

RoHS Pb c US



Description

The 391 Series are TE5® short circuit protector, fast-acting type, 65V rated fuses. For Short Circuit Protection of Sensitive Electronic Components and Assemblies.

Features

- For worldwide applications
- Reduced PCB space requirements
- Highly defined cut-off times
- Low internal resistance
- Flame resistant encapsulated casing
- RoHS compliant and Lead-free
- Available from 0.125A to 4A.

Agency Approvals

Agency	Agency File Number	Ampere Range
c US	E67006	0.125A - 4A

Applications

- Battery chargers
- Consumer Electronics
- Power supplies
- Industrial controllers

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

% of Ampere Rating	Opening Time
300	2 Seconds, **Max.**

Electrical Characteristics

Amp Code	Rated Current	Marking Code*	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Cold Resistance 0.1xI_N max. (mΩ)	Power Disspation 1.0xI_N max. (mW)	Melting Integral 10xI_N max. (A^2s)	Agency Approvals c US
0125	125 mA	SP13	65 V	50A @65VAC/VDC	3.4000	3400	190	0.006	x
0160	160 mA	SP16	65 V		2.4800	2450	210	0.011	x
0200	200 mA	SP20	65 V		1.7500	1750	240	0.020	x
0250	250 mA	SP25	65 V		0.1950	195	52	0.012	x
0315	315 mA	SP32	65 V		0.1850	155	65	0.018	x
0400	400 mA	SP40	65 V		0.1200	120	85	0.038	x
0500	500 mA	SP50	65 V		0.0950	95	105	0.063	x
0630	630 mA	SP63	65 V		0.0750	75	135	0.105	x
0800	800 mA	SP80	65 V		0.0580	58	170	0.170	x
1100	1.00 A	SP100	65 V		0.0460	46	220	0.280	x
1125	1.25 A	SP125	65 V		0.0370	37	270	0.450	x
1160	1.60 A	SP160	65 V		0.0290	29	350	0.832	x
1200	2.00 A	SP200	65 V		0.0236	23	440	1.060	x
1250	2.50 A	SP250	65 V		0.0180	18	550	2.219	x
1315	3.15 A	SP315	65 V		0.0140	14	700	3.870	x
1400	4.00 A	SP400	65 V		0.0115	12	900	6.500	x

NOTES:
1. * Physical Marking on top of the device.
2. Resistance is measured at 10% of rated current, 25°C.

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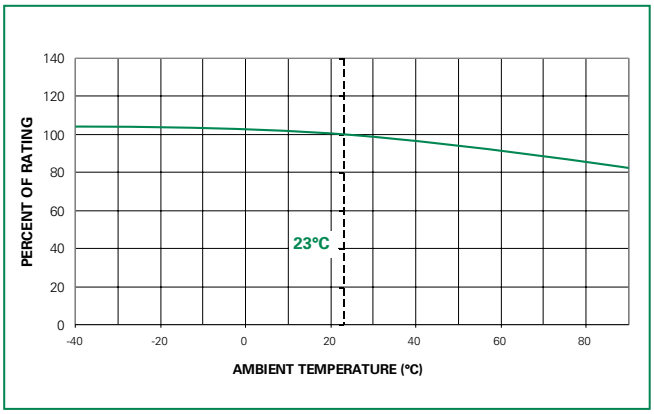
Radial Lead Fuses

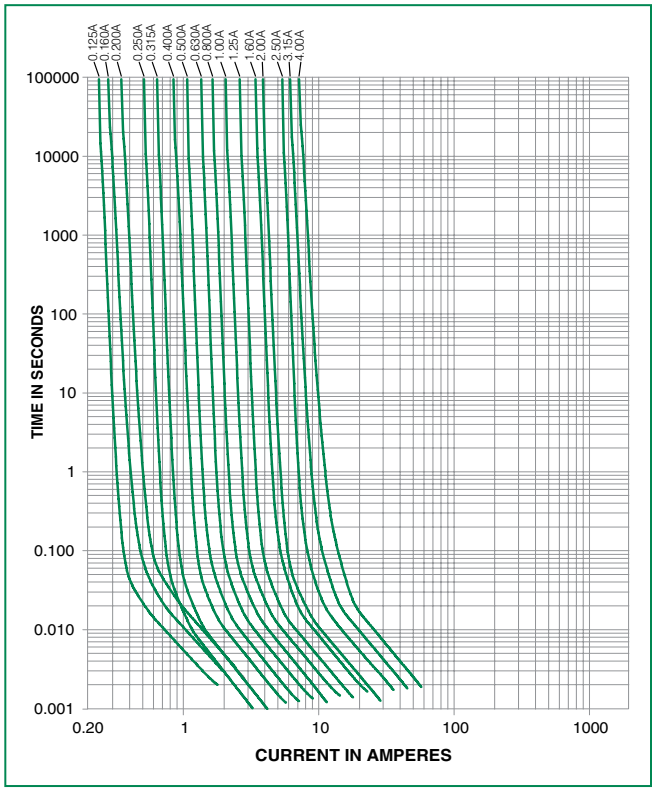
TE5® > Fast Acting Fuse > 391 Series

Temperature Re-rating Curve

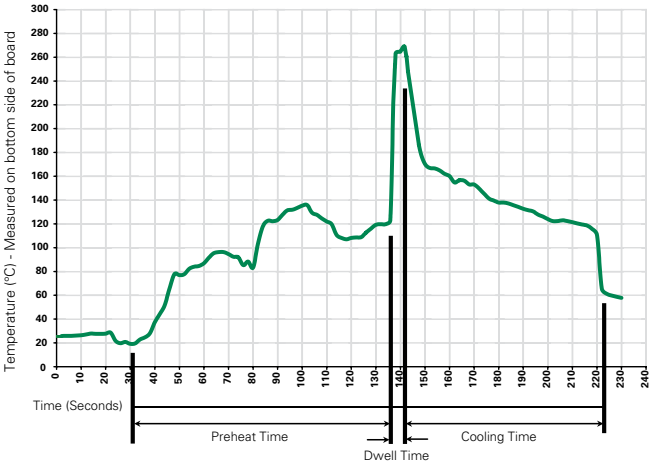


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100° C
Temperature Maximum:	150° C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260° C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350° C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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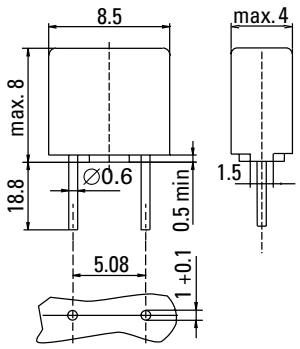
Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (EN 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider re-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-78)
Stock Conditions	+10 °C to +60 °C RH, ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10 g acceleration

Dimensions

Dimensions (mm)



Holes in the printed circuit board

Part Numbering System

391 xxxx 0000

Series

Amp Code

Refer to Amp Code column of Electrical Characteristics Table

Packaging Code

0000 Tape/Ammopack (1,400 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
391 Series				
Tape & Ammopack	N/A	1,400	0000	N/A

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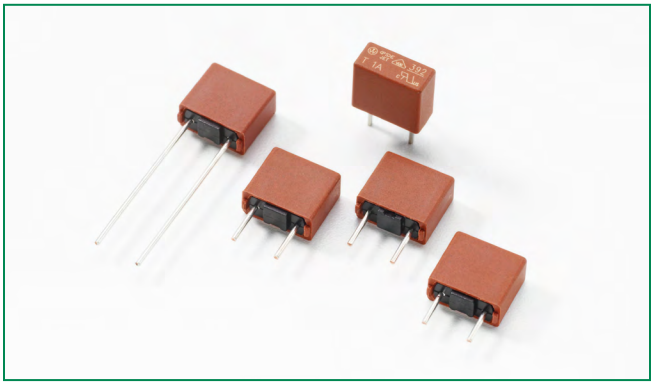
392 Series, TE5 Time-Lag Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
VDE	126983	0.28A - 6.3A
	1410866 1026673	0.8A - 4A 5A - 6.3A
c UL us	E67006	0.28A - 6.3A
PS E	JET1896-31007-2002	1A - 5A
CQC	CQC07012021162	0.8A - 6.3A
	SU05024 - 7013A SU05024 - 7014A SU05024 - 7015A SU05024 - 7016A SU05024 - 7017A SU05024 - 7018A	0.8A - 6.3A

Description

TE5 Fuse, Time-Lag type, 250V rated, designed in accordance to IEC 60127-3.

Features

- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Halogen free, Lead-free and RoHS compliant

Applications

- Battery Chargers
- Consumer Electronics
- Power supplies
- Industrial Controllers
- Chargers

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
150%	1 Hour, **Min.**
210%	120 s, **Max.**
275%	400 ms **Min.** ; 10 Sec. **Max.**
400%	150 ms **Min.** ; 3 Sec. **Max.**
1000%	20 ms **Min.** ; 150 ms **Max.**

Electrical Characteristic Specifications by Item

Rated Current	Amp Code	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0×I_N max. (mV)	Power Dissipation 1.5×I_N max. (mW)	Melting Integral 10×I_N max. (A^2s)	Agency Approvals					
								VDE		c UL us	PS E	CQC	
280 mA	0280	250V	35A@250VAC	0.3300	115	168	0.048	x		x			
800 mA	0800	250V	25A@250VAC	0.0960	110	280	5.120	x	x	x		x	x
1.00 A	1100	250V		0.0715	115	400	8.00	x	x	x	x	x	x
1.25 A	1125	250V		0.0569	100	500	11.95	x	x	x	x	x	x
1.60 A	1160	250V		0.0400	95	600	18.43	x	x	x	x	x	x
2.00 A	1200	250V		0.0298	90	700	29.00	x	x	x	x	x	x
2.50 A	1250	250V		0.0240	85	750	47.81	x	x	x	x	x	x
3.15 A	1315	250V	32A@250VAC	0.0170	80	1100	78.39	x	x	x	x	x	x
4.00 A	1400	250V	40A@250VAC	0.0128	75	1200	126.40	x	x	x	x	x	x
5.00 A	1500	250V	50A@250VAC	0.0101	70	1000	106.25	x	x	x	x	x	x
6.30 A	1630	250V	63A@250VAC	0.0077	65	1200	160.74	x	x	x		x	x

Notes:
1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.
2) Resistance is measured at 10% of rated current, 25°C.

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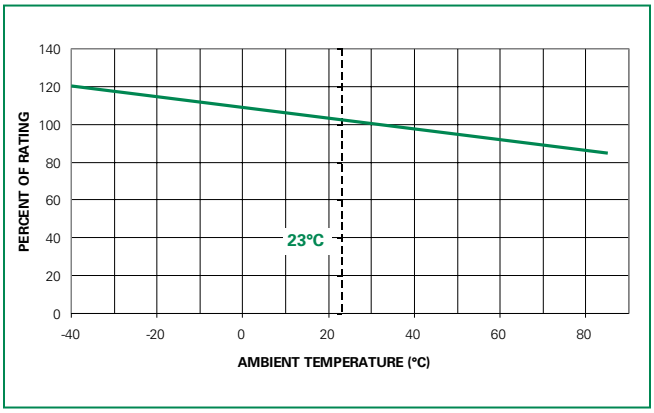
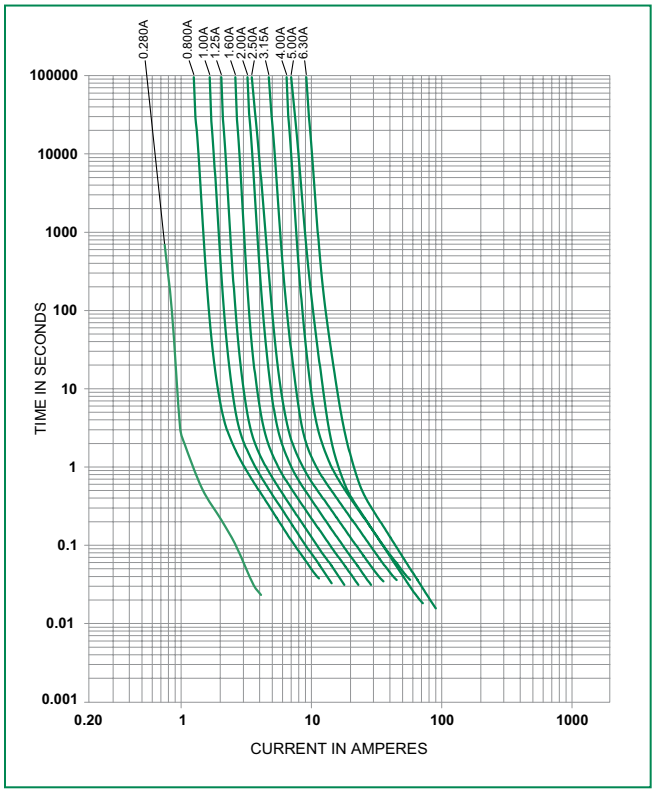
Temperature Re-rating Curve

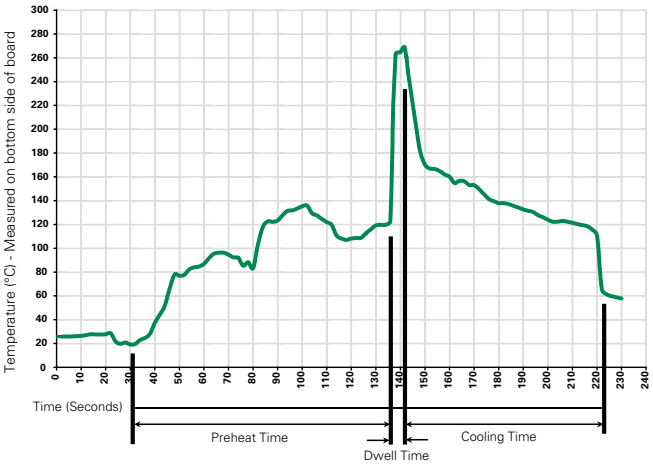


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Radial Lead Fuses

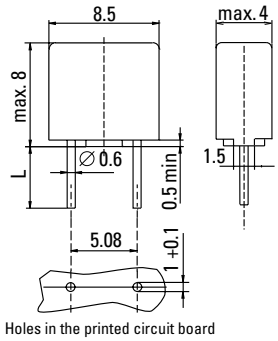
TE5 > Time-Lag Fuse > 392 Series

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3 sec. (Wave) 350°C, ≤ 3 sec. (Soldering iron)
Soldering Heat Resistance	260°C, 10 sec. (IEC 60068-2-20) 350°C, ≤ 3 sec. (Soldering iron)

Operating Temperature	–40°C to +85°C (Consider re-rating)
Climatic Category	–40°C to +85°C/21 days (IEC 60068-1, -2-1, -2-2, -2-78)
Stock Condition	+10°C to +60°C Relative humidity ≤ 75% yearly average, without dew, maximum value for 30 days - 95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 – 60Hz at 0.75mm amplitude 60 – 2000Hz at 10g acceleration

Dimensions



Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Part Numbering System

392 xxxx 0000

Series

Amp Code

Refer to Amp Code column of Electrical Characteristics Table

Packaging Code

0000 Tape/Ammopack (1,400 pcs.)
0440 Short Leads - Bulk (1,400 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
Tape and Ammopack	N/A	1,400	0000	N/A
Short Leads	N/A	1,400	0440	N/A

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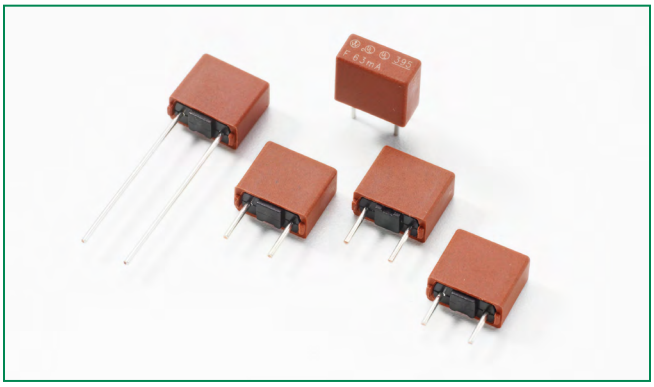
395 Series, TE5® Fast-Acting Fuse



Description

The 395 Series TE5® Fuses are fast-acting type, 125V and are designed in accordance to UL 248-14.

Features

- RoHS compliant and Lead-free
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Halogen Free
- Available from 0.05A to 6.3A

Applications

- Battery chargers
- Consumer Electronics
- Power supplies
- Industrial controllers

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E67006	0.05A-6.3A
cUL	E67006	0.05A-6.3A
PSE	JET1896-31007-1005	1A - 5A

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

% of Ampere Rating	Opening Time
200%	60 Seconds, **Max.**

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0xI_N max. (mV)	Power Dissipation 1.0xI_N max. (mW)	Melting Integral 10xI_N max. (A^2s)	Agency Approvals		
								UL	cUL	PSE
0050	50mA	125V	100A @125 VAC	8.1290	1600	85	0.0001	x	x	
0063	63mA	125V		4.6900	1300	85	0.0001	x	x	
0080	80mA	125V		3.6500	1200	100	0.0002	x	x	
0100	100mA	125V		7.4910	1100	110	0.0013	x	x	
0125	125mA	125V		6.1970	1350	160	0.0019	x	x	
0160	160mA	125V		4.2850	1000	150	0.0037	x	x	
0200	200mA	125V		2.9780	950	210	0.0075	x	x	
0250	250mA	125V		2.3100	900	225	0.0130	x	x	
0315	315mA	125V		1.7220	800	255	0.0260	x	x	
0400	400mA	125V		0.2200	230	95	0.0150	x	x	
0500	500mA	125V		0.1570	220	110	0.0250	x	x	
0630	630mA	125V		0.1180	210	135	0.0450	x	x	
0800	800mA	125V		0.0970	200	160	0.0680	x	x	
1100	1.00A	125V		0.0710	190	190	0.1300	x	x	x
1125	1.25A	125V		0.0635	180	225	0.2000	x	x	x
1160	1.60A	125V		0.0492	170	275	0.3900	x	x	x
1200	2.00A	125V		0.0412	160	450	0.5300	x	x	x
1250	2.50A	125V		0.0305	150	375	1.1000	x	x	x
1315	3.15A	125V		0.0247	140	445	1.9000	x	x	x
1400	4.00A	125V		0.0193	130	520	3.2000	x	x	x
1500	5.00A	125V		0.0139	120	600	6.1000	x	x	x
1630	6.30A	125V		0.0116	115	850	9.7000	x	x	

Notes:
1. 1.00 means the number one with two decimal places. 1,000 means the number one thousand.
2. Resistance is measured at 10% of rated current, 25°C.

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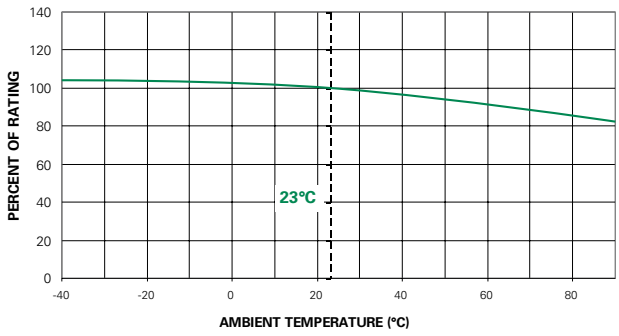
Radial Lead Fuses

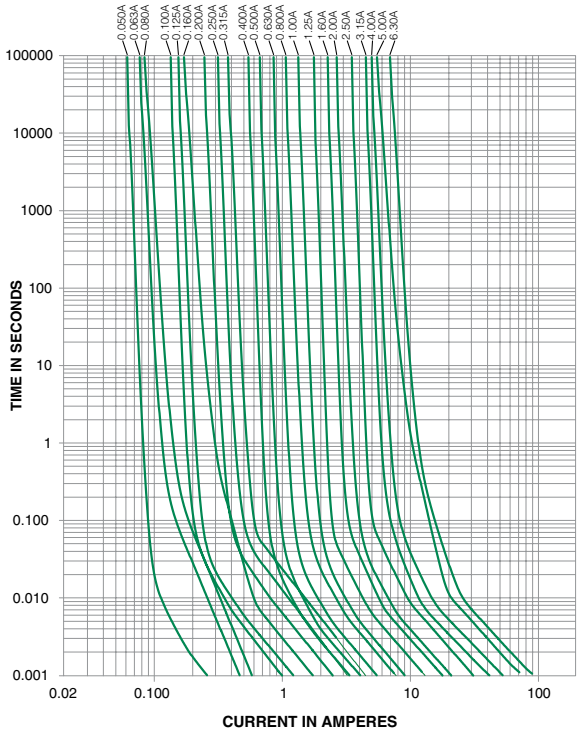
TE5® > Fast-Acting Fuse > 395 Series

Temperature Re-rating Curve

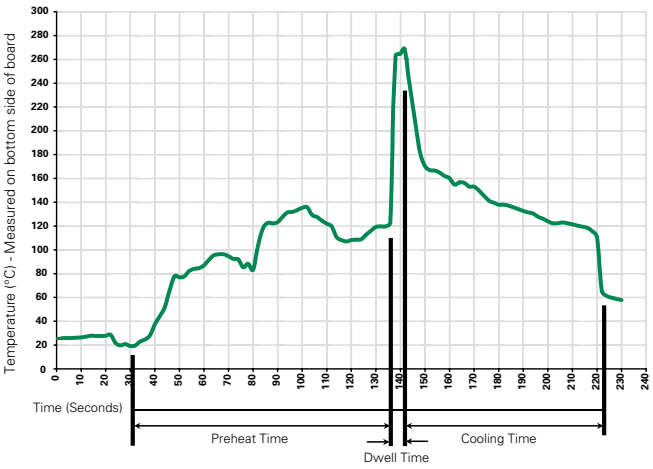


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Radial Lead Fuses

TE5® > Fast-Acting Fuse > 395 Series

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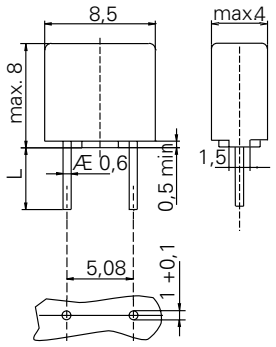
Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (Consider re-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration

Dimensions



Holes in PCB
Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Part Numbering System

395 xxxx 0000

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0000 Tape/Ammopack (1,400 pcs.)
0440 Short Leads - Bulk (1,400 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
395 Series				
Tape and Ammopack	N/A	1,400	0000	N/A
Short Leads	N/A	1,400	0440	N/A

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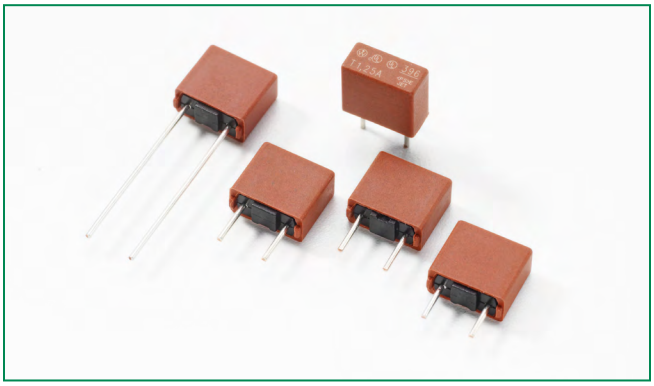
Revised: 03/03/17

396 Series, TE5® Time-Lag Fuse



Description

The 396 Series TE5® fuses are time-lag type, 125V rated, and are designed in accordance to UL 248-14.

Features

- Halogen free, Lead-free and RoHS compliant
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Internationally approved
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Available from 0.05A to 6.3A

Applications

- Battery chargers
- Consumer Electronics
- Power supplies
- Industrial controllers

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E67006	0.05A - 6.3A
cUL	E67006	0.05A - 6.3A
PSE	JET1896-31007-1005	1A - 5A

Electrical Characteristics

% of Ampere Rating	Opening Time
200%	60 Seconds, **Max.**

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0xI_N max. (mV)	Power Dissipation 1.0xI_N max. (mW)	Melting Integral 10xI_N max. (A^2s)	Agency Approvals		
								UL	cUL	PSE
0050	50mA	125V	100A@125 VAC	12.5000	900	45	0.011	x	x	
0063	63mA	125V		8.7900	800	50	0.017	x	x	
0080	80mA	125V		6.0090	700	55	0.02	x	x	
0100	100mA	125V		3.8400	600	60	0.04	x	x	
0125	125mA	125V		2.9000	550	70	0.05	x	x	
0160	160mA	125V		1.7700	480	80	0.09	x	x	
0200	200mA	125V		1.2000	390	80	0.14	x	x	
0250	250mA	125V		0.7500	350	90	0.26	x	x	
0315	315mA	125V		0.5450	300	95	0.32	x	x	
0400	400mA	125V		0.3750	250	100	0.58	x	x	
0500	500mA	125V		0.2470	220	110	0.86	x	x	
0630	630mA	125V		0.1850	210	135	1.15	x	x	
0800	800mA	125V		0.1250	160	130	1.92	x	x	
1100	1.00A	125V		0.0868	155	155	3.25	x	x	x
1125	1.25A	125V		0.0666	145	185	4.69	x	x	x
1160	1.60A	125V		0.0502	130	210	6.76	x	x	x
1200	2.00A	125V		0.0398	125	250	11.90	x	x	x
1250	2.50A	125V		0.0297	120	300	17.81	x	x	x
1315	3.15A	125V		0.0216	110	350	26.29	x	x	x
1400	4.00A	125V		0.0164	110	400	38.40	x	x	x
1500	5.00A	125V		0.0112	95	475	71.25	x	x	x
1630	6.30A	125V		0.0087	95	570	144.87	x	x	

Notes:
1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.
2) Resistance is measured at 10% of rated current, 25ºC.

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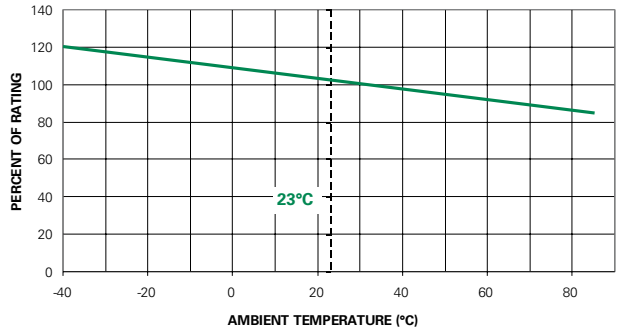
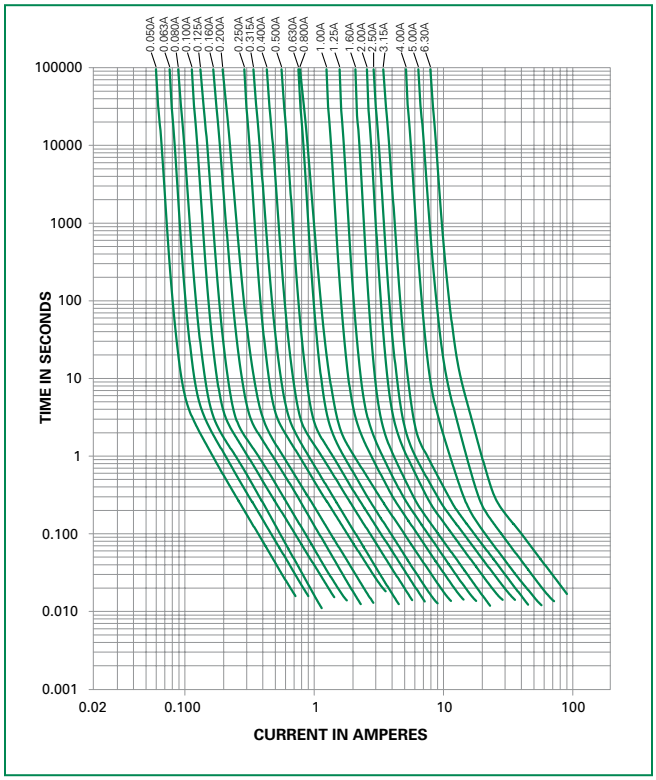
Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

Temperature Re-rating Curve

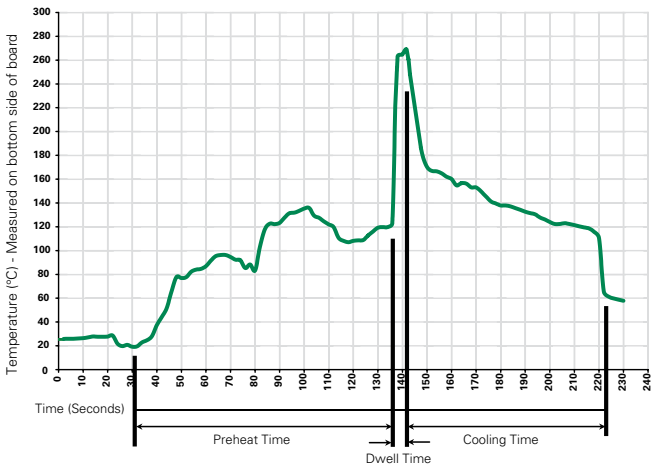


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Radial Lead Fuses

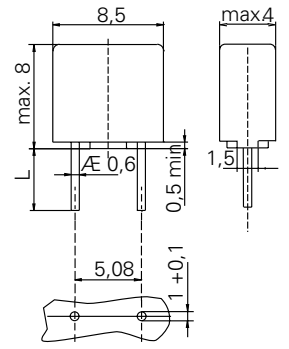
TE5® > Time-Lag Fuse > 396 Series

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (Consider re-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-2-78)
Stock Conditions	+10°C to +60°C RH ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration

Dimensions



Holes in PCB
Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

Part Numbering System

396 xxxx 0000

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Packaging Code
0000 Tape/Ammopack (1,400 pcs.)
0440 Short Leads - Bulk (1,400 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
396 Series				
Tape & Ammopack	N/A	1,400	0000	N/A
Short Leads	N/A	1,400	0440	N/A

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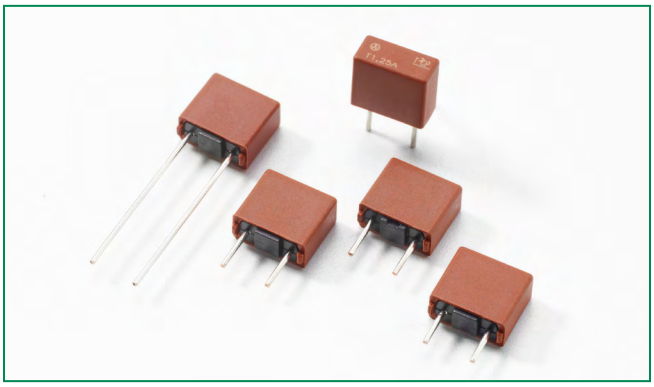
Revised: 03/03/17

397 Series, TE5 Transient Tolerant Fuse



Description

The 397 Series TE5 Fuses are SLO BLO® type, 125V rated and designed in accordance to UL248-14.

Features

- Surge Proof for telecom applications
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Shock safe casing
- Vibration resistant
- Lead-free, Halogen free and RoHS compliant
- Available from 0.35A to 1.5A

Applications

- Battery chargers
- Consumer Electronics
- Telecom Applications
- Power supplies
- Industrial controllers

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E67006	0.35A - 1.5A
cUL	E67006	0.35A - 1.5A

Electrical Characteristics

% of Ampere Rating	Opening Time
200%	60 Seconds, **Min.**
570%	80 ms. **Min.**; 2 Sec. **Max.**
1700%	200 s., **Max.**

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

Amp Code	Rated Current	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop $1.0 \times I_N$ max. (mV)	Power Dissipation $1.0 \times I_N$ max. (mW)	Melting Integral $10 \times I_N$ min. (A^2s)	Surge Amplitude (A)[1]			Agency Approvals	
								0.5665	Bellcore	ITU	UL	cUL
0350	350 mA	125 V	50A@125 VAC	0.5665	400	140	0.60	25	15	29	x	x
0500	500 mA	125 V		0.3424	340	170	1.10	30	17	38	x	x
0800	800 mA	125 V		0.1616	300	240	3.26	60	31	50	x	x
1100	1.00 A	125 V		0.1000	240	240	4.85	78	40	65	x	x
1125	1.25 A	125 V		0.0716	200	250	7.34	100	50	67	x	x
1150	1.50 A	125 V		0.0522	190	285	10.91	155	78	67	x	x

[1] FCC 47 Part 68: Minimum pulse load quantity is 2 pulses at a test generator output of 800 V and 10x560µs waveform.
ITU-T K.20: Minimum pulse load quantity is 30 pulses at a test generator output of 1000 V, 67 A and 10x700µs waveform.
Bellcore GR-1089: Minimum pulse load quantity is 50 pulses at a test generator output of 1000 V and 10x1000µs.

Notes:
1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.
2) Resistance is measured at 10% of rated current, 25°C.

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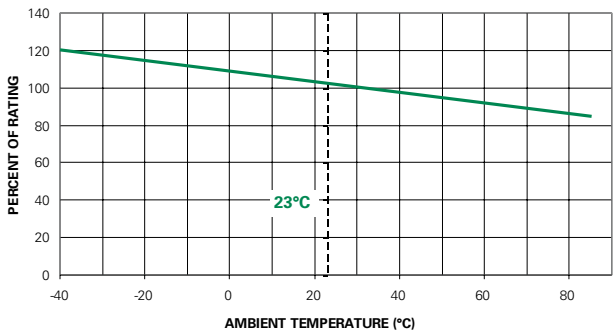
Revised: 03/03/17

Radial Lead Fuses

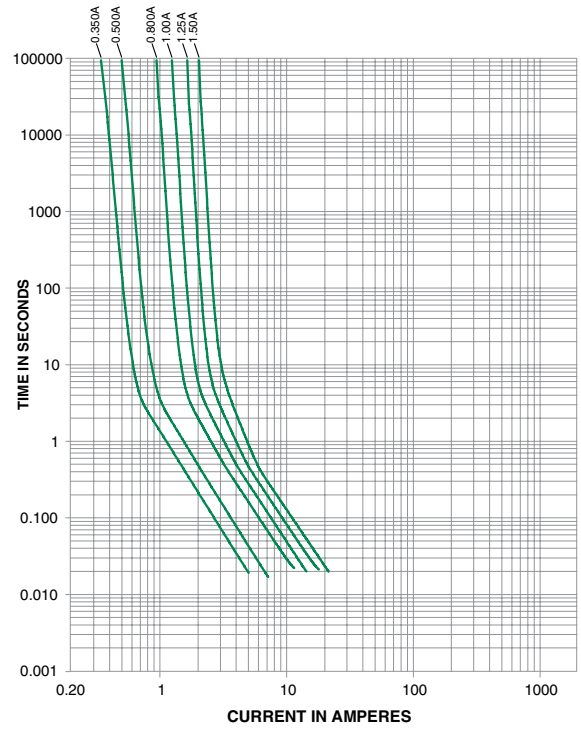
TE5 > Transient Tolerant Fuse > 397 Series

Temperature Re-rating Curve

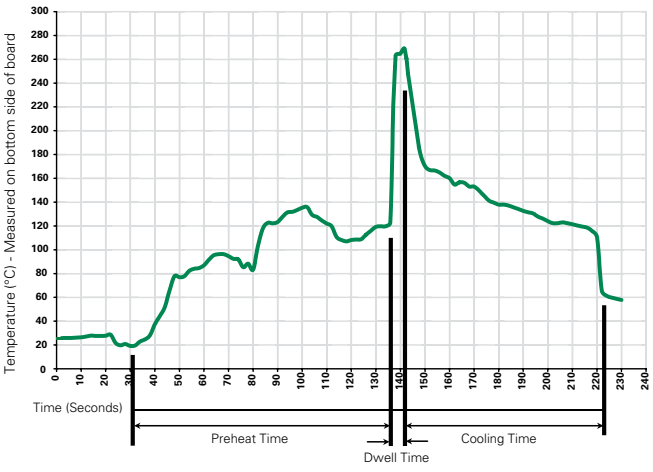


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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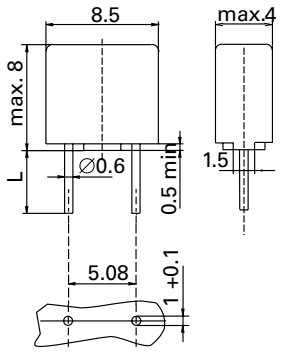
Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider de-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-78)
Stock Conditions	+10°C to +60°C RH, ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (EN 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration

Dimensions



Dimensions (mm)
Holes in PCB
Long Leads (L=18.8 mm)
Short Leads (L=4.3 mm)

Part Numbering System

397 xxxx 0000

Series

Amp Code

Refer to Amp Code column of Electrical Characteristics Table

Packaging Code

0000 Tape/Ammopack (1,400 pcs.)
0440 Short Leads - Bulk (1,400 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
397 Series				
Tape & Ammopack	N/A	1,400	0000	N/A
Short Leads	N/A	1,400	0440	N/A

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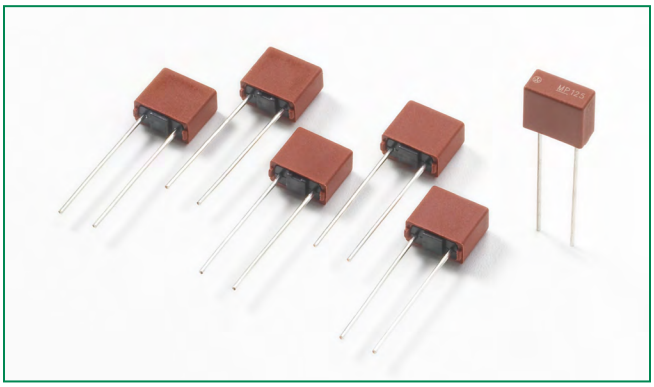
398 Series, TE5® Modul Protector® Fuse



Description

The 398 Series TE5® Fuses are short circuit protectors, medium Time-Lag type, and 65V rated.

Features

- Reduced PCB space requirements
- Highly defined cut-off times
- Low internal resistance
- Flame resistant encapsulated casing
- Available from 0.125A to 4A
- Halogen free, Lead-free and RoHS compliant

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E67006	0.125A - 4A

Applications

- Microprocessor protection

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

% of Ampere Rating	Opening Time
300	10 Seconds, **Max.**

Electrical Characteristics

Amp Code	Rated Current	Marking Code*	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Cold Resistance 0.1×I_N typ. (mΩ)	Power Disspation 1.0×I_N max. (mW)	Melting Integral 10×I_N max. (A^2s)	Agency Approvals c UL us
0125	125mA	MP13	65V	50A@65 VAC/DC	0.9610	900	50	0.036	x
0250	250mA	MP25	65V		0.3540	355	50	0.063	x
0315	315mA	MP32	65V		0.2600	261	60	0.08	x
0400	400mA	MP40	65V		0.1860	186	75	0.18	x
0500	500mA	MP50	65V		0.1540	155	90	0.33	x
0630	630mA	MP63	65V		0.1150	115	120	0.48	x
0800	800mA	MP80	65V		0.0850	85	140	1.02	x
1100	1.00A	MP100	65V		0.0640	65	170	1.10	x
1125	1.25A	MP125	65V		0.0480	48	210	2.34	x
1160	1.60A	MP160	65V		0.0340	34	320	4.66	x
1200	2.00A	MP200	65V		0.0260	26	425	8.40	x
1250	2.50A	MP250	65V		0.0210	21	550	14.81	x
1315	3.15A	MP315	65V		0.0155	16	650	29.27	x
1400	4.00A	MP400	65V		0.0120	12	1000	41.12	x

* Physical Marking on top of the device

Notes:

1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

2) Resistance is measured at 10% of rated current, 25ºC.

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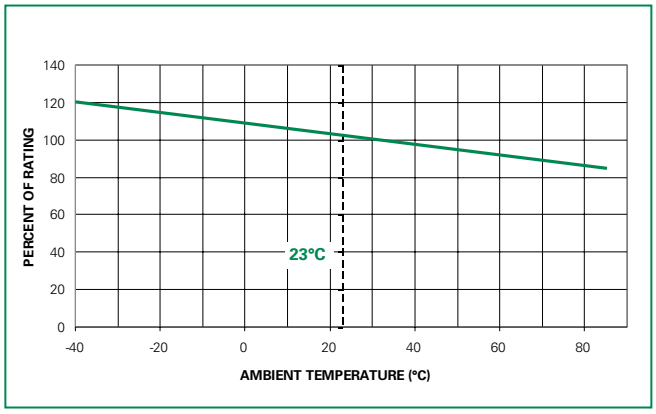
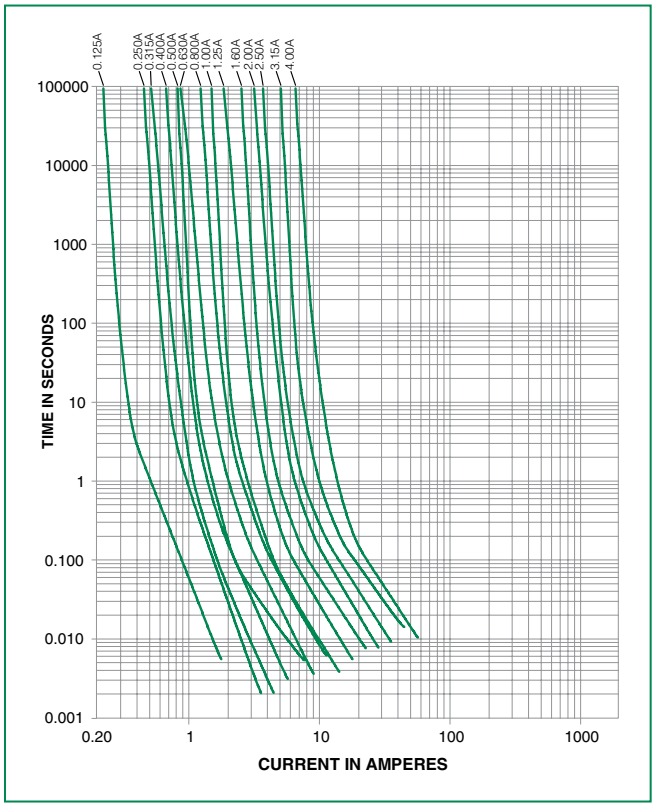
Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

Temperature Re-rating Curve

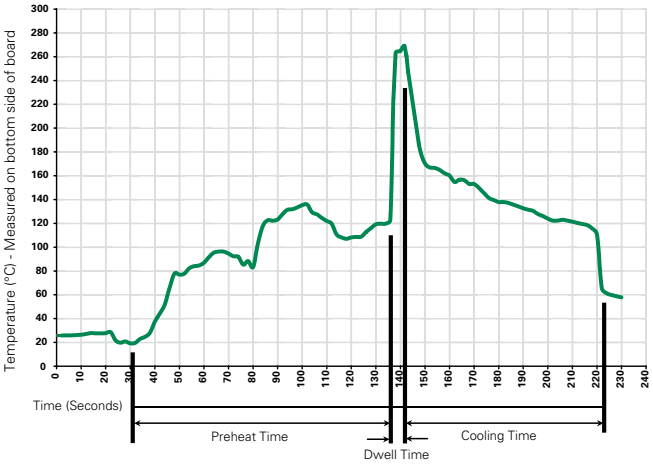


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Radial Lead Fuses

TE5® > Medium Time-Lag Fuse > 398 Series

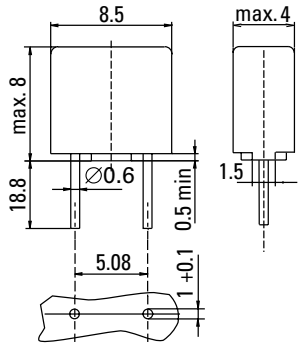
Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10N (EN 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (Consider re-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-78)
Stock Conditions	+10°C to +60°C RH, ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration

Dimensions

Dimensions (mm)



Holes in the printed circuit board

Part Numbering System

398 xxxx 0000

Series

Amp Code

Refer to Amp Code column of Electrical Characteristics Table

Packaging Code

0000 Tape/Ammopack (1,400 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
398 Series				
Tape & Ammopack	N/A	1,400	0000	N/A

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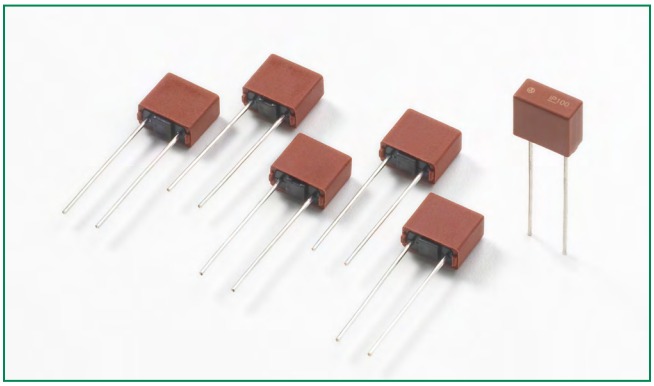
399 Series, TE5® Inrush Protector Fuse

HF RoHS



Description

The 399 Series TE5 Fuses are Time-Lag type, and are 65V rated. For Short Circuit Protection of Sensitive Electronic Components and Assemblies.

Features

- Reduced PCB space requirements
- Highly defined cut-off times
- Low internal resistance
- Flame resistant encapsulated casing
- Lead-free, Halogen free and RoHS Compliant
- Available from 0.125A to 4A

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E67006	0.125A - 4A

Applications

- IC Chip Protection

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

% of Ampere Rating	Opening Time
300	20 Seconds, **Max.**

Electrical Characteristics

Amp Code	Rated Current	Marking Code*	Voltage Rating	Breaking Capacity	Nominal Cold Resistance (Ohms)	Cold Resistance 0.1xI_N typ. (mΩ)	Power Disspation 1.0xI_N max. (mW)	Melting Integral 10xI_N max. (A^2s)	Agency Approvals c UL us
0125	125 mA	IP13	65 V	50A@65 VAC/ DC	1.7450	1600	125	0.1461	x
0160	160 mA	IP16	65 V		1.1000	1103	140	0.2099	x
0200	200 mA	IP20	65 V		0.7800	775	155	0.30	x
0250	250 mA	IP25	65 V		0.5500	550	170	0.42	x
0315	315 mA	IP32	65 V		0.3810	382	190	0.62	x
0400	400 mA	IP40	65 V		0.2650	264	220	0.92	x
0500	500 mA	IP50	65 V		0.1900	191	240	1.40	x
0630	630 mA	IP63	65 V		0.1300	129	265	2.04	x
0800	800 mA	IP80	65 V		0.0920	92	300	3.33	x
1100	1.00 A	IP100	65 V		0.0650	66	330	4.30	x
1125	1.25 A	IP125	65 V		0.0470	46	370	6.88	x
1160	1.60 A	IP160	65 V		0.0330	33	420	12.03	x
1200	2.00 A	IP200	65 V		0.0230	25	460	14.00	x
1250	2.50 A	IP250	65 V		0.0170	18	520	23.13	x
1315	3.15 A	IP315	65 V		0.0132	13	580	44.65	x
1400	4.00 A	IP400	65 V		0.0095	10	650	76.80	x

* Physical Marking on top of the device

Notes:

1) 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

2) Resistance is measured at 10% of rated current, 25ºC.

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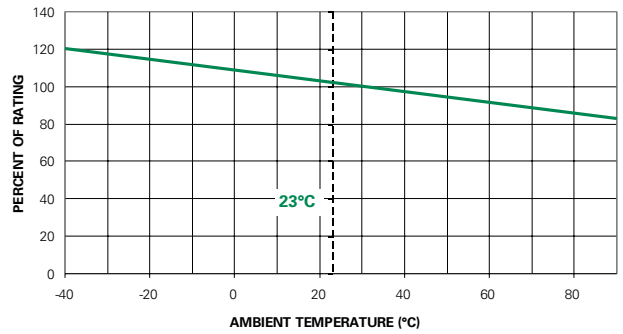
Revised: 03/03/17

Radial Lead Fuses

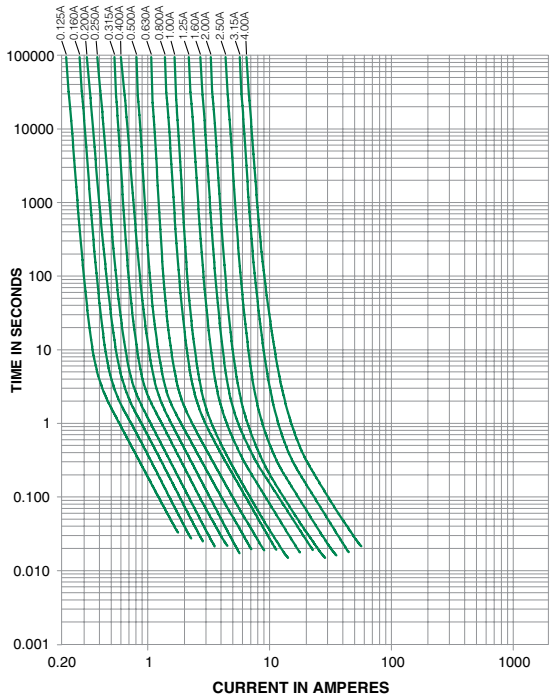
TE5® > Time-Lag Fuse > 399 Series

Temperature Re-rating Curve

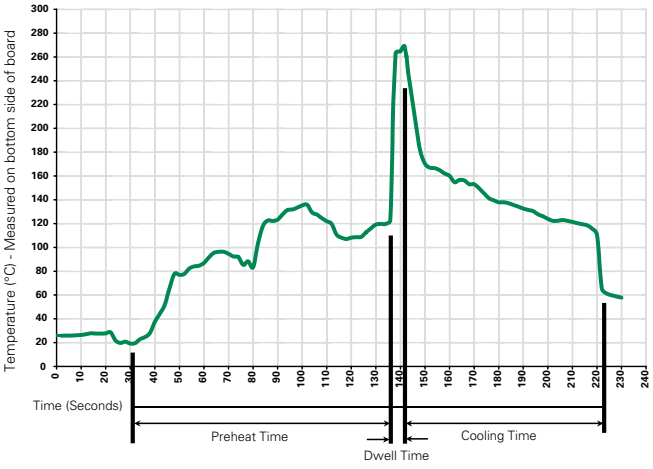


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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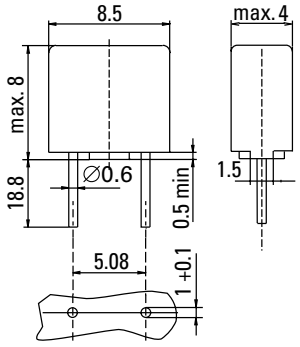
Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide PA 6.6, UL 94V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +85°C (consider de-rating)
Climatic Category	-40°C to +85°C/21 days (IEC 60068-1,-2-1,-2-2,-78)
Stock Conditions	+10°C to +60 °C RH, ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration

Dimensions

Dimensions (mm)



Holes in the printed circuit board

Part Numbering System

399 xxxx 0000

Series

Amp. Code
Refer to Amp Code column of Electrical Characteristic Table

Packaging Code
0000 Tape/Ammopack (1,400 pcs.)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
399 Series				
Tape & Ammopack	N/A	1,400	0000	N/A

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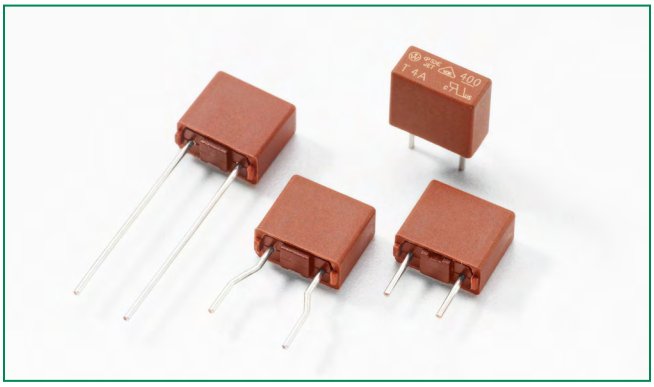
Revised: 03/03/17

400 Series, TE5® Fuse, Time-Lag



Description

The 400 Series TE5® Fuse is a Time-Lag type subminiature fuse and designed for overcurrent protection. It is 250V rated and designed in accordance to IEC 60127-3.

Features

- Halogen free, Lead-free and RoHS compliant
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Low internal resistance
- Shock safe casing
- Vibration resistant
- High Breaking Capacity up to 130A at 250VAC
- Internationally approved

Applications

- Battery chargers
- Consumer electronics
- Power supplies
- Industrial controllers

Additional Information

Datasheet | **Resources** | **Samples**

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E67006	0.50A – 6.3A
PS E	JET1896-31007-2001 JET1896-31007-1006	1A – 5A 6.3A
VDE	40026355	0.50A – 6.3A
CQC	CQC09012031624	0.50A – 6.3A
KC	SU05024-9004	0.50A – 6.3A
	SU05024-9003	1A – 2.5A
	SU05024-9001	3.15A
	SU05024-10003	4A – 5A
	SU05024-9002	6.3A

Electrical Characteristics

% of Ampere Rating	Opening Time
150%	1 Hour, Minimum
210%	120 Secs., Maximum
275%	400 ms, Minimum; 10 Secs., Maximum
400%	150 ms, Minimum; 3 Secs., Maximum
1000%	20 ms, Minimum; 150 ms, Maximum

Electrical Characteristics

Amp Code	Rated Current	Rated Voltage (V)	Breaking Capacity	Nominal Cold Resistance (Ohms)	Voltage Drop 1.0xI_N max. (mV)	Power Dissipation 1.0xI_N max. (mW)	Melting Integral 10xI_N max. (A^2s)	Agency Approvals				
								c UL us	PS E	VDE	CQC	KC
0.5	0.5A	250	130A @250VAC	0.1950	165	297	2.170	x		x	x	x
0800	0.8A	250		0.1003	116	387	6.720	x		x	x	x
1100	1.00A	250		0.0808	89	432	10.70	x	x	x	x	x
1125	1.25A	250		0.0562	76	411	14.44	x	x	x	x	x
1160	1.60A	250		0.0384	76	601	21.75	x	x	x	x	x
1200	2.00A	250		0.0292	75	758	46.00	x	x	x	x	x
1250	2.50A	250		0.0216	61	683	61.94	x	x	x	x	x
1315	3.15A	250		0.0167	55	921	101.61	x	x	x	x	x
1400	4.00A	250		0.0124	65	936	133.40	x	x	x	x	x
1500	5.00A	250		0.0098	56	948	216.50	x	x	x	x	x
1630	6.30A	250		0.0072	48	926	323.08	x	x	x	x	x

* Per VDE, approved breaking capacity is at 100A, 250VAC

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Application testing is strongly recommended. Specifications are subject to change without notice.
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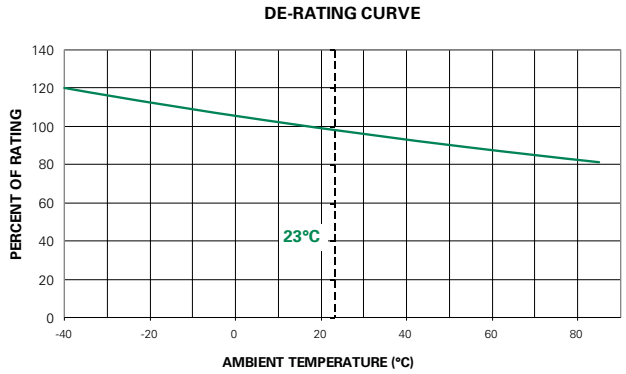
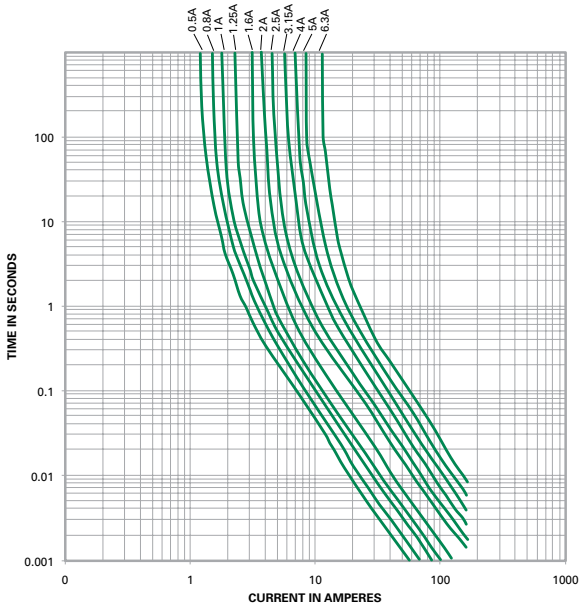
Temperature Re-rating Curve

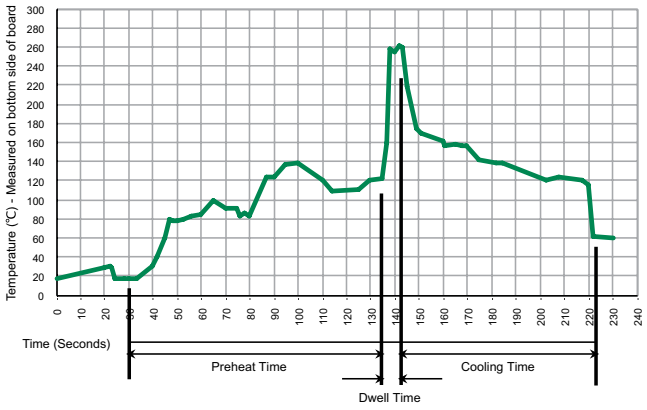


Note
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Radial Lead Fuses

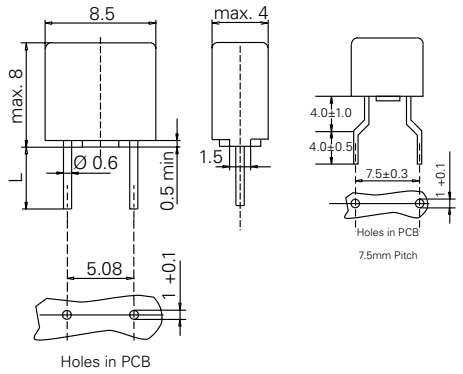
TE5® Fuse > Time-Lag Fuse > 400 Series

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide, UL 94 V-0 Round Pins: Copper, Tin-plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	–40°C to +85°C (Consider re-rating)
Climatic Category	–40°C to +85°C/21 days (IEC 60068-1, -2-1, -2-2, -2-78)
Stock Conditions	+10°C to +60°C relative humidity 75% yearly average, without dew, maximum value for 30 days – 95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60028-2-6) 10–60Hz at 0.75mm amplitude 20–2000Hz at 10g acceleration

Dimensions



Long Leads (L=18.8±0.3mm)
Short Leads (L=4.3±0.3mm)

Part Numbering System

400 xxxx 0000

Series

Amp Code

Refer to Amp Code column of Electrical Characteristics Table

Packaging Code

0000 Tape/Ammopack (1,400 pcs)
0440 Shortleads - Bulk (1,400 pcs)
0075 7.5mm pitch - Bulk (1,400 pcs)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
400 Series				
Tape & Ammopack	N/A	1,400	0000	N/A
Short Leads	N/A	1,400	0440	N/A
7.5 mm Pitch	N/A	1,400	0075	N/A

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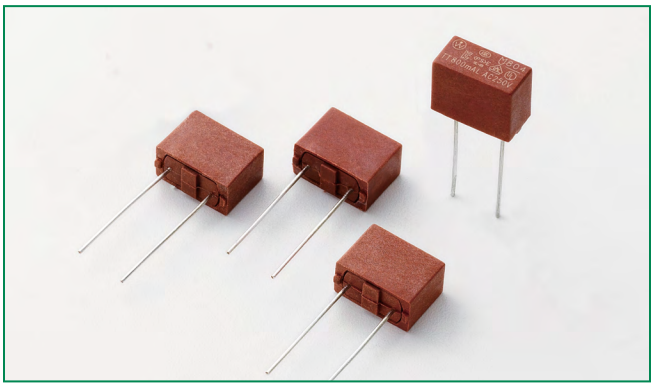
804 Series Fuse, TE, Time-Lag Fuse



Description

The 804 Series is a TE Universal Modular Fuse (UMF), TT time-lag type subminiature fuse designed for overcurrent protection. It is 250V rated and designed in accordance to IEC 60127-4.

Features

- Lead-free, Halogen-free and RoHS compliant.
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Excellent surge tolerance due to high i^2t values

Applications

- Battery Charger
- Consumer Electronics
- Power Supplies
- Industrial Controllers

Agency Approvals

Agency	Agency File Number	Ampere Range
	E242325	0.80A – 6.3A
	40029388	0.80A – 6.3A
	CQC10012048703	0.80A, 1.25A – 6.3A
	NBK060111-JP1021A NBK060111-JP1021B NBK060111-JP1021C	1A – 2.5A 3.15A – 5A 6.3A
	SU05024-10005 SU05024-10004 SU05024-10006	0.8A 1 – 2.5A 3.15 – 6.3A

Electrical Characteristics

% of Ampere Rating	Opening Time
125%	3600 secs **Minimum**
200%	120 secs **Maximum**
1000%	100 milliseconds **Minimum** 1 secs **Maximum**

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

Amp Code	Ampere Rating	Rated Voltage	Interrupting Rating	Nominal Cold Resistance (Ohms)	Voltage Drop $1.0 \times I_N$ max [mV]	Power Dissipation $1.25 \times I_N$ max [mW]	Melting Integral $10 \times I_N$ max [A^2s]	Agency Approvals				
0800	0.80A	250V	150A @250VAC	0.1887	218	332	12.480	x	x	x	x	
1100	1.00A	250V		0.1166	171	324	20.000	x	x			x
1125	1.25A	250V		0.0816	151	352	30.00	x	x	x	x	x
1160	1.60A	250V		0.0569	135	464	51.00	x	x	x	x	x
1200	2.00A	250V		0.0458	183	486	88.00	x	x	x	x	x
1250	2.50A	250V		0.0349	118	675	137.50	x	x	x	x	x
1315	3.15A	250V		0.0228	163	818	212.94	x	x	x	x	x
1400	4.00A	250V		0.0174	128	945	368.00	x	x	x	x	x
1500	5.00A	250V		0.0138	98	1091	748.00	x	x	x	x	x
1630	6.30A	250V		0.0100	78	1125	1099.00	x	x	x	x	x

Note:
1. Resistance is measured at 10% of rated current, 25°C.

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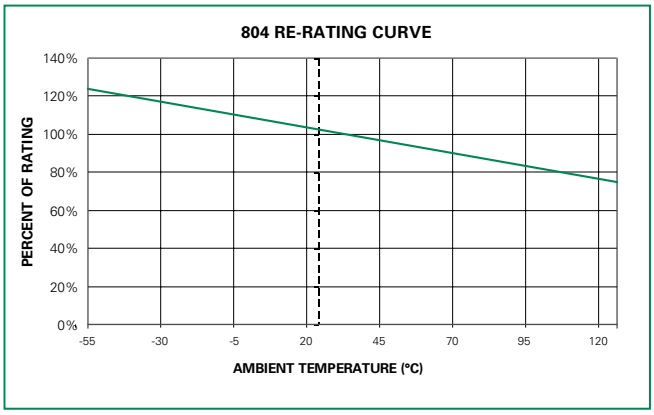
Revised: 03/03/17

Radial Lead Fuses

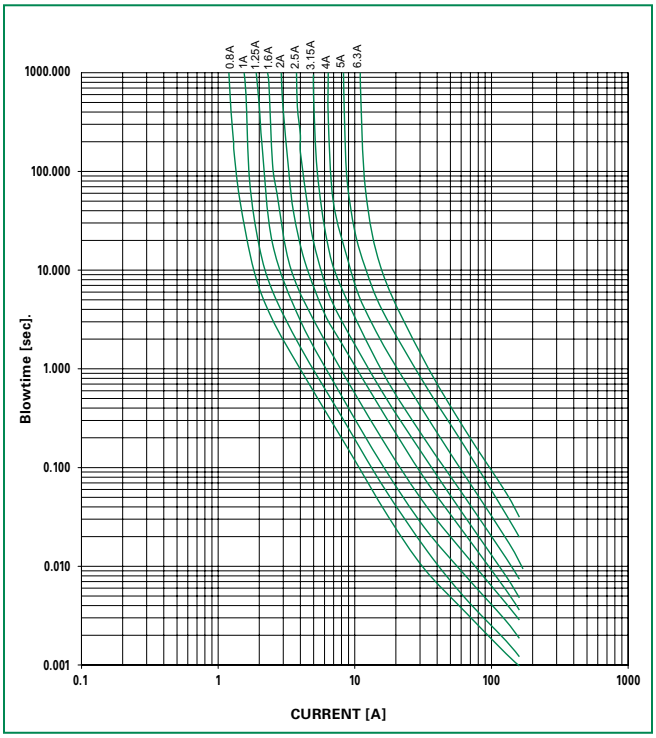
TE > Time-Lag Fuse > 804 Series

Temperature Re-rating Curve

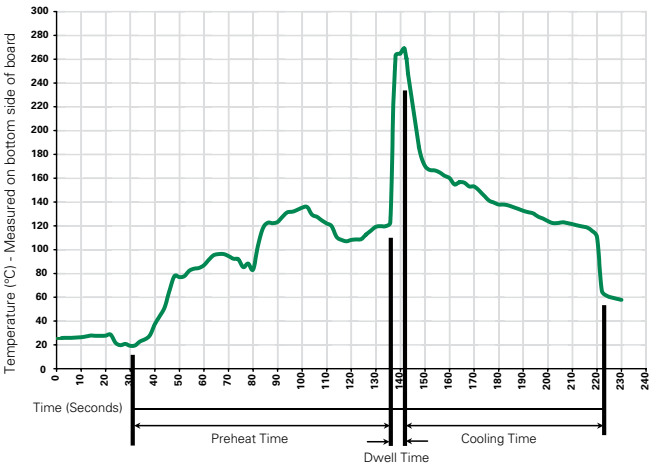


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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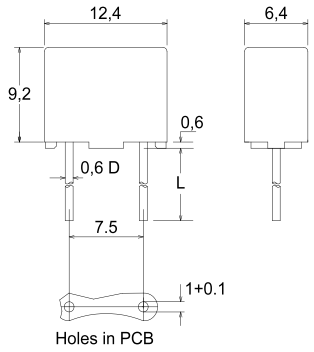
Revised: 03/03/17

Product Characteristics

Materials	Base/Cap: Brown Thermoplastic Polyamide, UL 94V-0 Round Pins: Copper, Sn Plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Soldering Heat Resistance	260°C, 10s. (IEC 60068-2-20) 350°C, 3s. (Soldering Iron)

Operating Temperature	-40°C to +125°C (Consider re-rating)
Climatic Category	-40°C/+85°C/21 days (IEC 60068-1, -2-1, -2-2, -2-78)
Stock Conditions	+10°C to +60°C relative humidity 75% yearly average, without dew, maximum value for 30 days – 95%
Vibration Resistance	24 cycles at 15 min. each (IEC60028-2-6) 10 – 60Hz at 0.75mm amplitude 20 – 2000Hz at 10g acceleration

Dimensions



LONG LEADS (L=18.8 +/-0.3mm)
SHORT LEADS (L=4.3 +/-0.3mm)

Part Numbering System

804 xxxx 0000

SERIES

AMP Code

Refer to Amp Code column of Electrical Characteristics Table

PACKAGING Code

0000 Tape/Ammopack (1000 pcs)
0440 Short Leads – Bulk (1000 pcs)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
804 Series				
Tape & Ammopack	N/A	1,000	0000	N/A
Short Leads	N/A	1,000	0440	N/A

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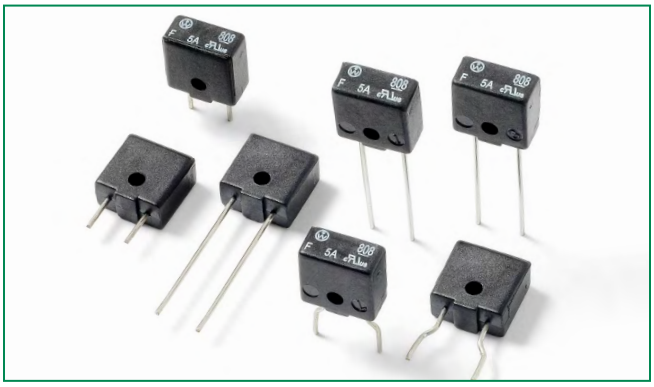
808 Series TE5® Fast-Acting 450V Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
PSE	NBK060111-JP1021A	2.00A - 5.00A
cULus	E67006	2.00A - 5.00A

Additional Information

Datasheet | **Resources** | **Samples**

Description

The 450V TE5® Fast-acting Fuse is designed to enable compliance with the RoHS Directive. This product is fully compatible with lead-free solder alloy. This device is UL Recognized for protecting components or internal circuits against overcurrent conditions at high DC voltages.

Features

- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Low internal resistance
- Halogen free, Lead-free, and RoHS compliant
- Shock safe casing
- Vibration resistant
- Antimony-free
- Ideal for high voltage DC applications
- Very high breaking capacity of 10kA at rated DC voltage

Applications

- DC/DC Converter
- Transformer-less AC/DC Circuit
- Data Centers
- Telecom/Datacom Central Offices

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 Hours, Minimum
200%	10 Seconds, Maximum

Electrical Characteristics

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)		Interrupting Rating[1]	Nominal Cold Resistance[2] (Ohms)	Nominal Melting I^2t $10xI_N$ (A^2sec)	Max Voltage Drop $1.0xI_N$ (mV)	Agency Approval cULus
		AC	DC					
2.00	1200	250	450	200A@250VAC 300A to 10kA@450VDC	0.069	0.0610	342	x
2.50	1250	250	450		0.054	0.0898	300	x
3.00	1300	250	350	200A@250VAC 300A to 10kA@350VDC	0.042	0.2007	276	x
3.15	1315	250	350		0.038	0.2191	270	x
4.00	1400	250	250	200A@250VAC 300A to 10kA@250VDC	0.027	0.5445	240	x
5.00	1500	250	250		0.022	1.1584	215	x

Notes:

1. This fuse is not recommended for use in DC circuits where the available prospective short-circuit current is less than 300A at rated voltage.
2. Cold resistance measured at less than 10% of rated current at 23°C.
3. An operating current of 80% or less of rated current is recommended, with further derating required at elevated ambient temperature.
4. Have special electrical characteristic needs? Contact Littelfuse to learn more about application specific options.

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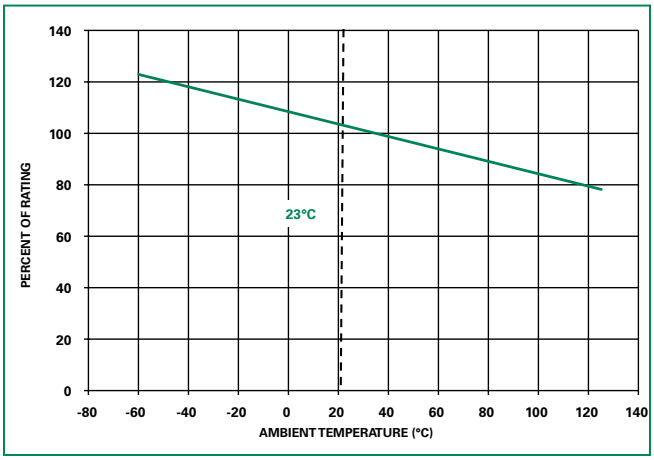
Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

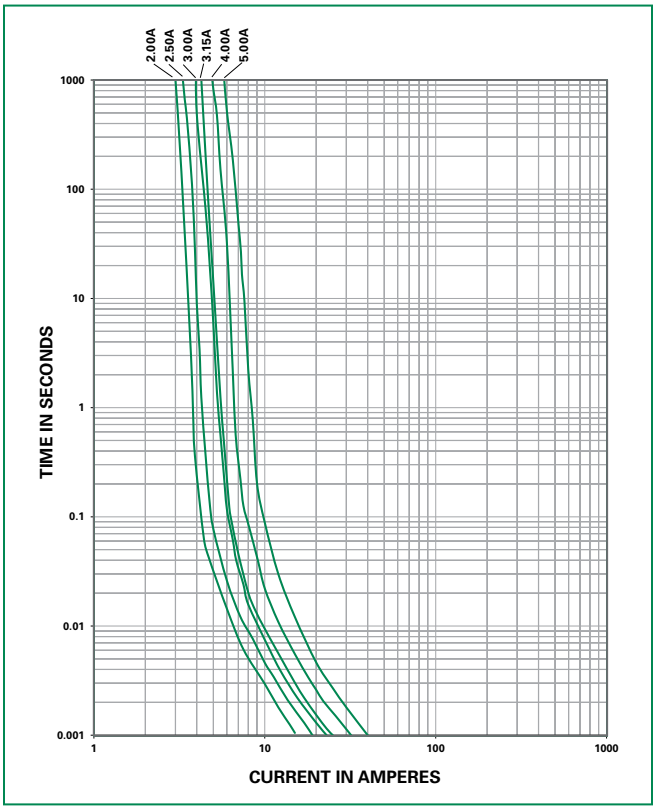
Temperature Re-rating Curve



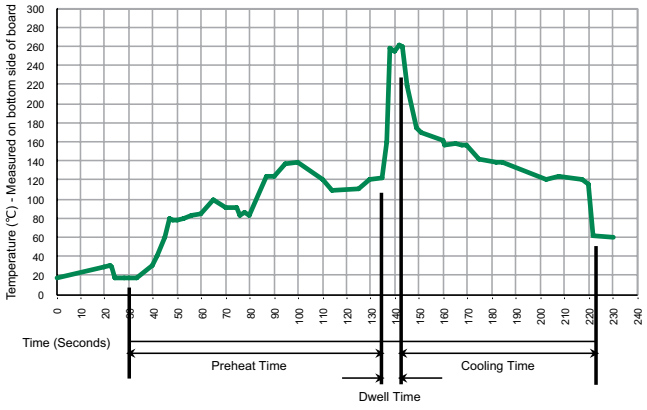
Note:

1. Rerating depicted in this curve is in addition to the standard derating of 20% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Radial Lead Fuses

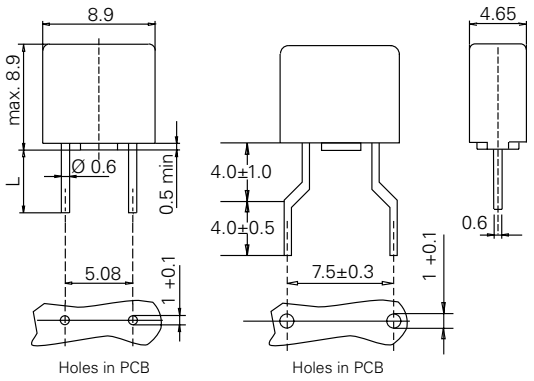
TE5® > Fast Acting 450V Fuse > 808 Series

Product Characteristics

Materials	Base/Cap: Black Thermoplastic Polyphenylene Sulfide, UL 94 V-0 Round Pins: Copper, Sn-plated
Product Marking	Body: Brand Logo, Current Rating Rated Voltage, Characteristic "F"
Solderability	260°C, ≤ 3s. (Wave) 350°C, ≤ 1s. (Soldering Iron)
Thermal Shock	50 cycles, 15 minutes at –65°C/15 minutes at 125°C (MIL-STD-202, Method 107)

Operating Temperature	-65°C to +125°C (Consider re-rating)
Moisture Resistance	10 cycles, 65°C at 90-98% R.H. over 150 minutes, 180 minutes holding time, Reduce temperature to 23 – 35°C over 150 minutes, 8 hours holding time
Vibration Resistance	24 cycles at 5 min. each (IEC60068-2-6) 10-60Hz at 0.75mm amplitude 60-2000Hz at 10G's acceleration

Dimensions



Long Leads (L=18.8mm)
Short Leads (L=4.3mm)

7.5mm Pitch

Part Numbering System

808 xxxx 0000

Series

Amp Code

Refer to Amp Code column of Electrical Characteristics Table

Packaging Code

0000 Tape/Ammopack (1,000 pcs)
0440 Short leads - Bulk (1,000 pcs)
0075 7.5mm pitch - Bulk (1,000 pcs)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
808 Series				
Tape & Ammopack	N/A	1,000	0000	N/A
Short Leads	N/A	1,000	0440	N/A
7.5 mm Pitch	N/A	1,000	0075	N/A

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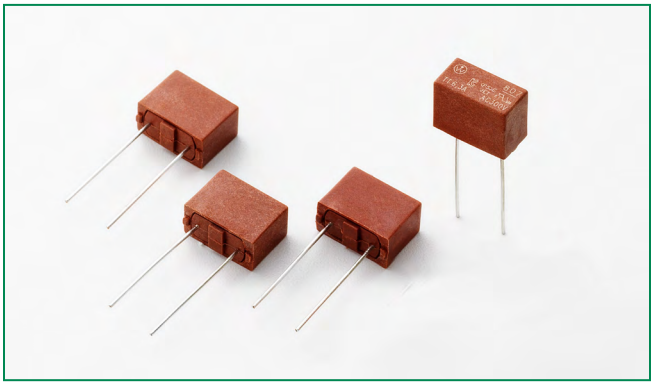
807 Series Fuse



Description

TE7 807 Series is a time-lag type subminiature fuse designed for overcurrent protection.

Features

- Lead-free, Halogen-free and RoHS compliant
- Reduced PCB space requirements
- Direct solderable or plug-in versions
- Low internal resistance
- Shock safe casing
- Vibration resistant
- Excellent surge tolerance due to high i^2t values

Applications

- Battery Charger
- Consumer Electronics
- Power Supplies
- Industrial Controllers

Additional Information

Datasheet | Resources | Samples

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E67006	0.80A – 6.3A
	SU05024-10005 SU05024-10004 SU05024-10006	0.8A 1-2.5A 3.15-6.3A
PS E	JET1896-31007-2004 JET1896-31007-2005	1A - 5A 6.30A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
125%	3600 secs., **Minimum**
200%	120 secs., **Maximum**
1000%	100 milliseconds **Minimum** 1 secs., **Maximum**

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Voltage Drop $1.0\times I_N$ max [mV]	Power Dissipation $1.25\times I_N$ max [mW]	Melting Integral $10\times I_N$ max [A^2s]	Agency Approvals		
								c UL us		PS E
0800	0.80A	300V	100A @300VAC	0.1887	218	332	12.480	x	x	
1100	1.00A	300V		0.1166	171	324	20.000	x	x	x
1125	1.25A	300V		0.0816	151	352	30.00	x	x	x
1160	1.60A	300V		0.0569	135	464	51.00	x	x	x
1200	2.00A	300V		0.0458	183	486	88.00	x	x	x
1250	2.50A	300V		0.0349	118	675	137.50	x	x	x
1315	3.15A	300V		0.0228	163	818	212.94	x	x	x
1400	4.00A	300V		0.0174	128	945	368.00	x	x	x
1500	5.00A	300V		0.0138	98	1091	748.00	x	x	x
1630	6.30A	300V		0.0100	78	1125	1099.00	x	x	x

Note:
1. Resistance is measured at 10% of rated current, 25°C.

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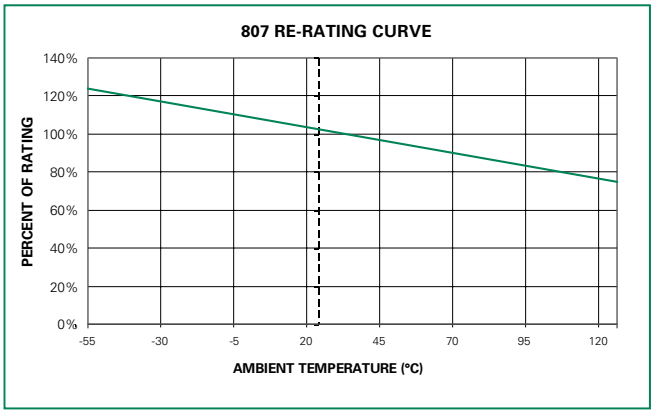
Radial Lead Fuses

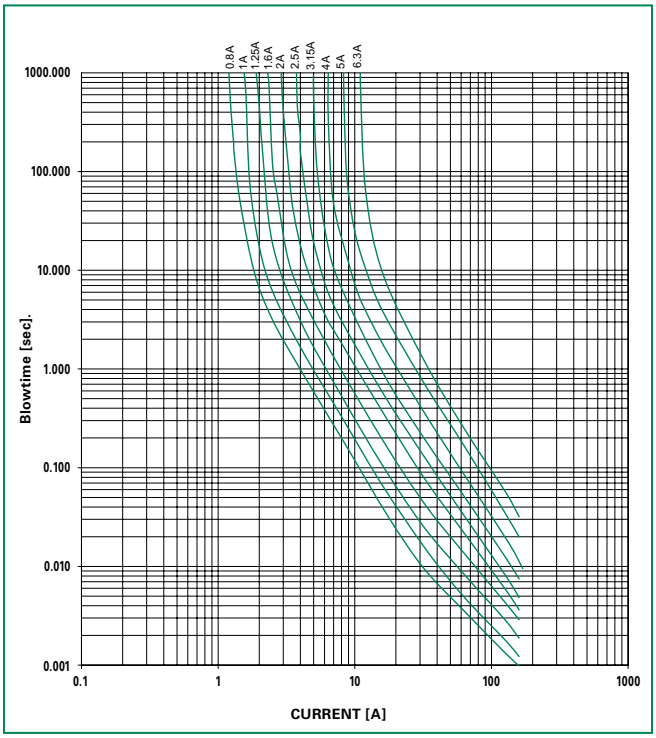
TE7 > Time-Lag Fuse > 807 Series

Temperature De-rating Curve

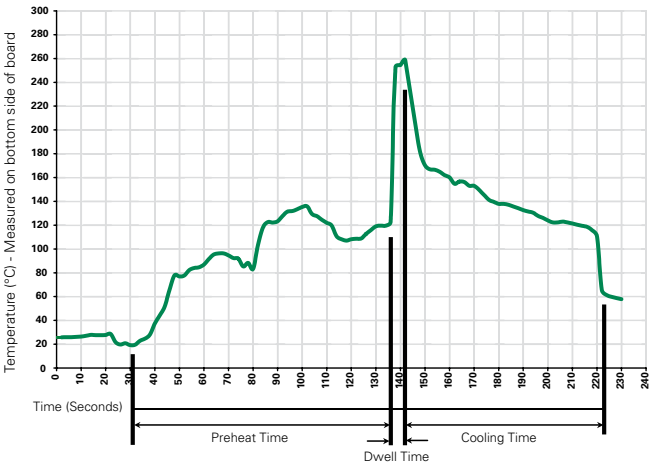


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100˚C
Temperature Maximum:	150˚C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260˚C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350˚C ± 5˚C
Heating Time: 5 seconds maximum

Note: These devices are not recommended for IR or Convection Reflow Process.

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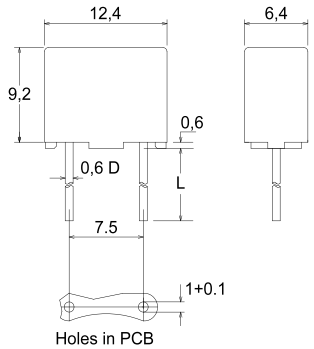
Product Characteristics

Materials	**Base/Cap:** Brown Thermoplastic Polyamide, UL 94V-0 **Round Pins:** Copper, Sn Plated
Lead Pull Strength	10 N (IEC 60068-2-21)
Solderability	260˚C, ≤ 3s (Wave) 350˚C, ≤ 1s (Soldering Iron)
Soldering Heat Resistance	260˚C, 10s (IEC 60068-2-20) 350˚C, 3s (Soldering Iron)

Operating Temperature	-40˚C to +125˚C (Consider re-rating)
Climatic Category	-40˚C/+85˚C/21 days (IEC 60068-1, -2-1, -2-2, -2-78)
Stock Conditions	+10˚C to +60˚C relative humidity 75% yearly average, without dew, maximum value for 30 days – 95%
Vibration Resistance	24 cycles at 15 min. each (IEC60028-2-6) 10 - 60Hz at 0.75mm amplitude 20 – 2000Hz at 10g acceleration

Dimensions



LONG LEADS (L=18.8 +/-0.3mm)
SHORT LEADS (L=4.3 +/-0.3mm)

Part Numbering System

807 xxxx 0000

SERIES

AMP Code

Refer to Amp Code column of Electrical Characteristics Table

PACKAGING Code

0000 Tape/Ammopack (900 pcs)
0440 Short Leads – Bulk (900 pcs)

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
807 Series				
Tape & Ammopack	N/A	1,000	0000	N/A
Short Leads	N/A	1,000	0440	N/A

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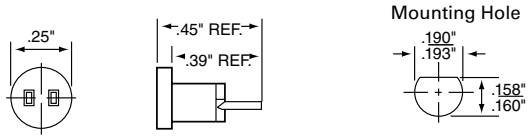
281/282 Series Panel Mount Holders for MICRO™/TR3 Fuses

281 Series Panel Mount

Front of Panel Mounting
with Push-On / Rear Retaining Nut

Dimensions units in inch (mm)

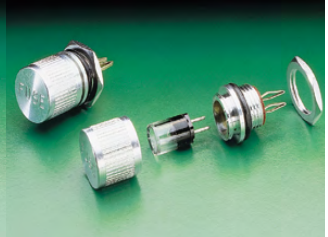
0281 0001
Front of Panel Mounting with Push-On / Rear Retaining Nut



282 Series Panel Mount - Sealed/Moisture Resist Knob

Note: These products are shipped unassembled and without fuse device

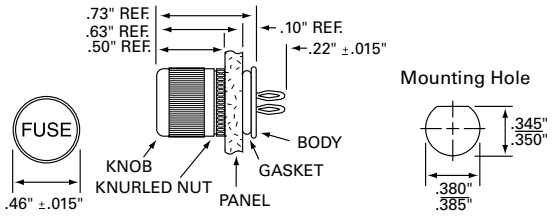
Rear of Panel Mounting
with Threaded Knurled /
Front Retaining Nut



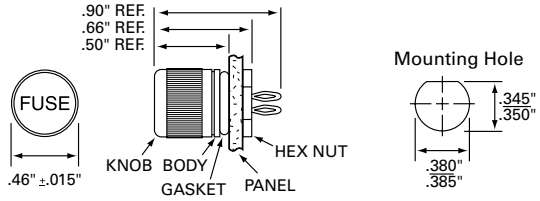
Front of Panel Mounting
with Threaded Hex /
Rear Retaining Nut

Dimensions units in inch (mm)

0282 0002 and 0282 0008
Rear of Panel Mounting with Threaded Knurled / Front Retaining Nut



0282 0001 and 0282 0007
Front of Panel Mounting with Threaded Hex / Rear Retaining Nut



Product Characteristics

Compatible Fuses	MICRO™/TR3
Description	Panel mount holder designed for Littelfuse MICRO™/TR3 type and other fuse series with .025" diameter leads rated to 5 amps
Electrical Specs	Rated at 5 amperes for any voltage up to 125
Mounting Specs	Maximum panel thickness is .09"
Ambient Temp.	–40°C to +125°C
Retaining Hardware	"Push-On" retaining nut
Molded Material	Black Thermoset
Terminal Material	Beryllium copper with silver plating

Note: Ensure proper fuseholder re-rating.

Product Characteristics

Compatible Fuses	MICRO™/TR3
Description	RF-shielded and drip-proof screw-on knob design enables use of Littelfuse MICRO™/TR3 fuses when presence of moisture exists at front of panels
Electrical Specs	Rated at 5 amperes for any voltage up to 125
Mounting Specs	Front panel mount, maximum panel thickness: .093" Rear panel mount, maximum panel thickness: .125"
Ambient Temp.	–40°C to +125°C
Mounting Gasket Options	Neoprene (282001, 282002) or Conductive Silicone (282007, 282008)
Retaining Hardware Options	Threaded Hex Nut (282002, 282008) or Threaded Knurled Nut (282001, 282007)
Molded Material	Black thermoset
Housing, Knob and Nut Material	Aluminum, untreated
Terminal Material	Beryllium copper with silver plating
Knob Seal	Buna "N" O-ring inside the knob

Note: Ensure proper fuseholder re-rating.

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Radial Leaded Fuse Holders

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Ordering Information

Ordering Number
02810001H

Ordering Information

Ordering Number		Gasket Type
Rear Mounting (Threaded Knurled Nut)	Front Mounting (Threaded Hex Nut)	
02820002Z	**02820001Z**	Neoprene
02820008Z	**02820007Z**	Conductive Silicone

Note: These products are shipped unassembled and without fuse device

Additional Information

Datasheet 281 Series

Resources 281 Series

Samples 281 Series

Datasheet 282 Series

Resources 282 Series

Samples 282 Series

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Radial Leaded Fuse Holders

281/556/557 Series Thru-Hole Circuit Board Mount Holders for Micro™/TR-3 Fuses

RoHS

281 Series PC Mount - Vertical

281 Series PC Mount - Horizontal

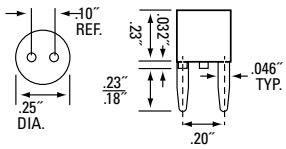
556 Series PC Mount - Vertical

557 Series PC Mount - Horizontal

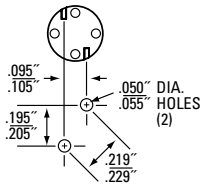
Note: These products are shipped without fuse device

Dimensions units in inch (mm)

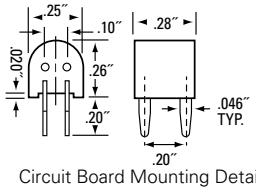
0281 0005H, 0281 0008H
White / Vertical Mount Devices



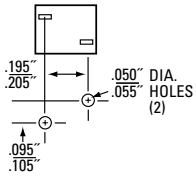
Circuit Board Mounting Detail



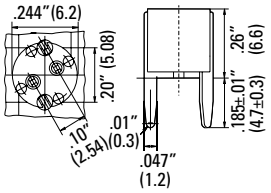
0281 0007H, 0281 0010H
White / Horizontal Mount Devices



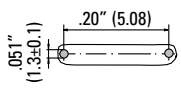
Circuit Board Mounting Detail



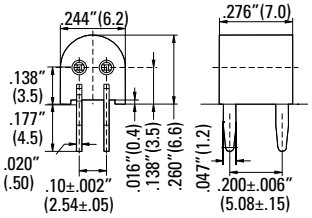
556 0000 0001
Black / Vertical Mount Devices



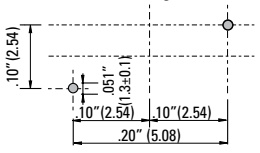
Circuit Board Mounting Detail



557 0000 0001
Black / Horizontal Mount Devices



Circuit Board Mounting Detail



Product Characteristics

	281 Series Vertical	281 Series Horizontal	556 Series Vertical	557 Series Horizontal
Compatible Fuses	MICRO™/TR3®			
Description	Thru-hole circuit board mount holders designed for Littelfuse MICRO™/TR3 type and other fuse series with .025″ diameter leads rated to 5 amps			
Electrical	Rated at 5A / 1.6W to 125 volts.			
Mounting Method	PC Board Thru-Hole @ 5.08 hole spacing			
Mount Color & Direction	White Vertical	White Horizontal	Black Vertical	Black Horizontal
Molded Part Specs	White Thermoplastic UL 94V0 PBT		Black Thermoplastic UL 94V0	
Metal Parts and Terminals	Copper Alloy with options Tin Plating (281008, 281010) or Silver Plating (281005, 281007)		Copper Alloy with Tin Plating	
Ambient Temperature	–40°C to +100°C.			
Unit Weight	0.41g	0.50g	0.42g	0.51g

Note: Ensure proper fuseholder re-rating.

Agency Approvals

Agency	Agency File Number		
	281 Series	556 Series	557 Series
	E14721	N/A	N/A

Ordering Information

Ordering Number	Terminal Plating	Mount Color	Mount Direction	Packaging
0281 0005 H	Silver[1]	White	Vertical	100 (Bulk pack)
0281 0008 H	Tin[1]	White	Vertical	100 (Bulk pack)
0281 0007 H	Silver[1]	White	Horizontal	100 (Bulk pack)
0281 0010 H	Tin[1]	White	Horizontal	100 (Bulk pack)
556 0000 0001*	Tin	Black	Vertical	1000 (Bulk pack)
557 0000 0001*	Tin	Black	Horizontal	1000 (Bulk pack)

1. UL recognized.
* RoHs compliant.
Note: 0281 Series have Glow Wire

Additional Information

Datasheet | **Resources** | **Samples**

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Radial Leaded Fuse Holders

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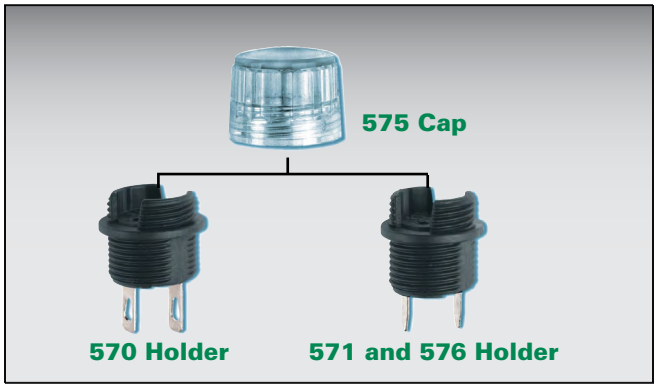
570/571/576 Series Fuse Holders with Cap for TE5/TR5 Type Fuses

RoHS

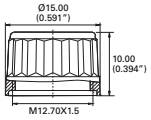


Agency Approvals

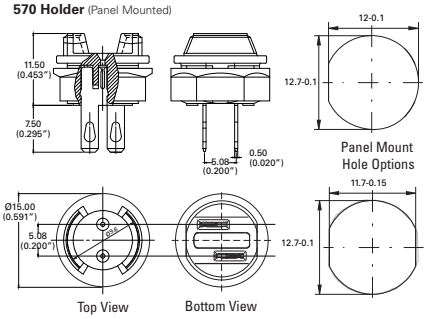
Agency	Agency File Number		
	570 Series	571 Series	576 Series
	E14721		
VDE	N/A	N/A	40024733

Dimensions units in mm (inch)

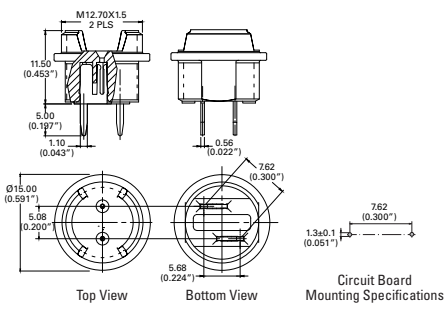
575 Cap



570 Holder (Panel Mounted)



571 and 576 Holder (Circuit Board Mounted)



Product Characteristics

	570 Series	571 Series	576 Series
Compatible Fuses	TR5/TE5		
Materials	**Holder:** Black Thermoplastic, UL 94 V-0		
	Cap: Transparent Thermoplastic Polycarbonat PC, UL94 V-0		
	Metal Parts: Copper alloy Solderable tinned		
Rated Voltage	250V		
Max. Current/ Power:	6.3 A/2.5W	6.3 A/2.5W	6.3 A/1.6W
Mounting	**Panel Mounted:** 12.7mm diameter D-hole or double D-hole. Admissible torque on plastic hex nut is 1.2Nm	**Printed Circuit Board (PCB) Mounted:** 7.62mm hole spacing for wave soldering	
Terminals	Solderable or 2.8mm quick connect – fits 0.5mm tab	Solderable pin terminals – fits 1.3mm hole	
Minimum Cross Section	Conductor - 2.5mm²	Conducting path - 0.2mm²	
Unit Weight	2.2g (Holder) 0.94g (Cap)	1.6g (Holder) 0.94g (Cap)	1.6g (Holder) 0.94g (Cap)

Note: Ensure proper fuseholder re-rating.

Ordering Information

Catalog Number	Description	Packaging
570 0000 0001	**Holder:** Panel Mount w/ Quick Connect Terminals	Bulk Pack 100
571 0000 0001	**Holder:** PCB Mount w/ Solderable Pin Terminals - 2.5W Max	Bulk Pack 100
576 0000 0001	**Holder:** PCB Mount w/ Solderable Pin Terminals - 1.6W Max	Bulk Pack 100
575 0000 0001	**Cap:** Fits all holders 570, 571 and 576 series	Bulk Pack 100

Additional Information

Datasheet 570 Series | **Resources 570 Series** | **Samples 570 Series**

Datasheet 571 Series | **Resources 571 Series** | **Samples 571 Series**

Datasheet 576 Series | **Resources 576 Series** | **Samples 576 Series**

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Radial Leaded Fuse Holders

562/564 Series Circuit Board Mount Holders for TE5/TR5 Type Fuses

RoHS

Product Characteristics

	562 Series	564 Series
Compatible Fuses	TR5/TE5	
Materials	**Holder:** Black Thermoplastic, UL94 V-0 PET	
	Terminals: Copper alloy; solderable tinned	
Electrical Data (23°C)	**Rated Voltage:** 250V	
	Max. Current/Power: 6.3A/1.6W	
Mounting	PC Board, 5.08mm pin spacing	PC Board, 5.08mm pad spacing
Minimum Cross Section	Conducting path - 0.1mm²	Conducting path - 0.1mm²
Unit Weight	0.12g	0.44g

Note: Ensure proper fuseholder re-rating.

Agency Approvals

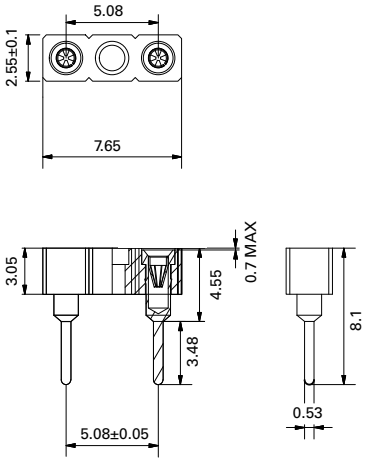
Agency	Agency File Number	
	562 Series	564 Series
	E70164	E70164

Ordering Information

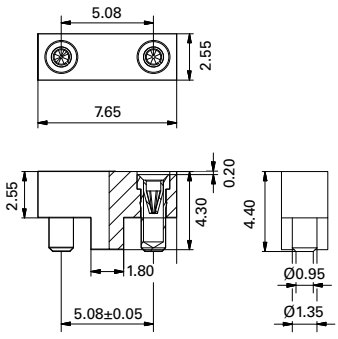
Ordering Number	Circuit Board Mounting	Packaging
562 0000 1009	Thru-Hole	1000 (Bulk pack)
564 0000 1009	Surface Mount	1500 (Tape /Reel)

Dimensions units in mm

562 Series Holder



564 Series Holder



Additional Information

- Datasheet 562 Series
- Resources 562 Series
- Samples 562 Series
- Datasheet 564 Series
- Resources 564 Series
- Samples 564 Series

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Radial Leaded Fuse Holders

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Expertise Applied | Answers Delivered

559/560 Series Fuse Holders for TE5/TR5 Type Fuses

559 Series Holder

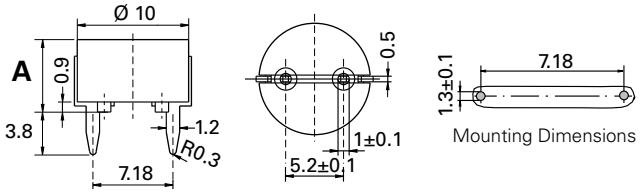
560 Series Holder

Agency Approvals

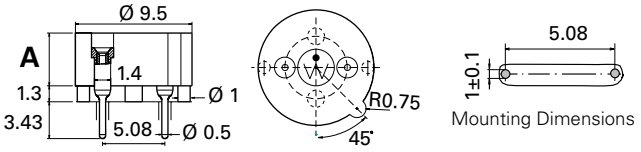
Agency	Agency File Number	
	559 Series	560 Series
	N/A	40041024
	N/A	E14721

Dimensions units in mm

559 Series



560 Series



Product Characteristics

	559 Series (Lead Free)	560 Series
Compatible Fuses	TR5/TE5	TR5/TE5
Materials	**Holder:** Black Thermoplastic, UL94 V-0	**Holder:** Thermoplastic, UL 94 V-0
	Metal Parts: Copper alloy; solderable tinned	
Electrical Data (23°C)	**Rated Voltage:** 250V	
	Max. Current/Power: 6.3 A /1.6 W	
Mounting	PC Board, 7.18 mm pin spacing	PC Board, 5.08 mm pin spacing
Solderability	max. 260 °C, 10 s (Wave)	
Minimum Cross Section	Conducting path - 0.1 mm²	
Unit Weight	0.63 g	0,4 g

Note: Ensure proper fuseholder re-rating.

Ordering Information

Ordering Number	"A" Height Options	Packaging
559 0000 00 01	6.5 mm (code 0001)	1000 Pcs Bulk
559 0000 80 11	10 mm (code 8011)	100 Pcs Bulk
560 0000 13 19	3.0 mm (code 1319)	500 Pcs Bulk
560 0000 10 09	4.3 mm (code 1009)	500 Pcs Bulk
560 0000 10 19	4.3 mm (code 1019)	1000 Pcs Bulk

Additional Information

Datasheet 559 Series
Resources 559 Series
Samples 559 Series
Datasheet 560 Series
Resources 560 Series
Samples 560 Series

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251/253 Series, PICO® II Very Fast-Acting Fuse

HF

Description

The PICO® II Very Fast-Acting Fuse is designed to meet an extensive array of performance characteristics in a space-saving subminiature package.

Features

- Very fast-acting
- Small size
- Wide current rating range (0.062A- 15A)
- Halogen-free available
- Wide operating temperature range
- Low temperature re-rating

Agency Approvals

Agency	Agency File Number 253 Series	Agency File Number 251 Series	Ampere Range
	N/A	E10480	0.062A - 15A
	N/A	29862	0.062A - 15A
	N/A	PSE_NBK200416-JP1021	1A - 5A
	N/A	J50158379	0.500A - 10A
QPL	FM10	N/A	0.062A - 15A
	N/A	2009010207366577	0.500A, 1A, 2A, 2.5A, 3A, 4A, 5A

Applications

Secondary protection for space constrained applications

- Flat–panel display TV
- LCD monitor
- LCD backlight inverter
- Office machines
- Power supply
- Audio/Video system
- Lighting system
- Medical equipment

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.062A - 15A	4 Hours, Min.
200%	0.062A - 7A	1 Second, Max.
	10A	3 Seconds, Max.
	12 - 15A	10 Seconds, Max.
275%	0.500A, 1A, 2A, 2.5A, 3A, 4A, 5A, 7A, 10A	300 msecs., Max.
400%	0.05A, 1A, 2A, 2.5A, 3A, 4A, 5A, 7A, 10A	30 msecs., Max.
1000%	0.500A, 1A, 2A, 2.5A, 3A, 4A, 5A, 7A, 10A	4 msecs., Max.

Additional Information

Datasheet 251 Series
Resources 251 Series
Samples 251 Series
Datasheet 253 Series
Resources 253 Series
Samples 253 Series

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Electrical Specifications by Item

Ampere Rating (A)	Amp Code	Ordering Number (Std.)	Ordering Number (Mil.)	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Nom Voltage Drop (V)	Agency Approvals					
.062	.062	251.062	253.062	125	300 A @ 125VDC 50A@125VAC For CCC 7A: 70A@125VAC For CCC 10A: 100A@ 125VAC	7.000	0.000113	1.4	x	x			x	
.125	.125	251.125	253.125	125		1.700	0.00174	0.285	x	x			x	
.200	.200	251.200	253.200	125		0.895	0.0048	0.345	x	x				
.250	.250	251.250	253.250	125		0.665	0.0116	0.24	x	x			x	
.375	.375	251.375	253.375	125		0.395	0.0296	0.215	x	x			x	
.500	.500	251.500	253.500	125		0.302	0.0598	0.2165	x	x		x	x	x
.630	.630	251.630		125		0.205	0.08	0.188	x	x				
.750	.750	251.750	253.750	125		0.175	0.153	0.176	x	x		x	x	
1.00	001.	251001.	253001.	125		0.128	0.256	0.194	x	x	x	x	x	x
1.25	1.25	2511.25		125		0.100	0.390	0.2	x	x	x			
1.50	01.5	25101.5	25301.5	125		0.0823	0.587	0.21	x	x	x	x	x	
2.00	002.	251002.	253002.	125		0.0473	0.405	0.141	x	x	x	x	x	x
2.50	02.5	25102.5		125		0.0360	0.721	0.132	x	x	x	x		x
3.00	003.	251003.	253003.	125		0.0295	1.19	0.131	x	x	x	x	x	x
3.50	03.5	25103.5		125		0.0240	1.58	0.1205	x	x	x	x		
4.00	004.	251004.	253004.	125		0.0204	2.45	0.114	x	x	x	x	x	x
5.00	005.	251005.	253005.	125		0.0158	4.14	0.11	x	x	x	x	x	x
7.00	007.	251007.	253007.	125		0.0107	10.4	0.102	x	x		x	x	
10.0	010.	251010.	253010.	125		0.0072	25.5	0.1	x	x		x	x	
12.0	012.	251012.		32	300A@32VDC & 50A@32VAC	0.0059	45.2	0.0878	x	x				
15.0	015.	251015.	253015.	32		0.00446	68.8	0.071	x	x			x	

Note: Higher ampere ratings are available. Please contact Littelfuse Technical Support or your Littelfuse products representative for assistance.

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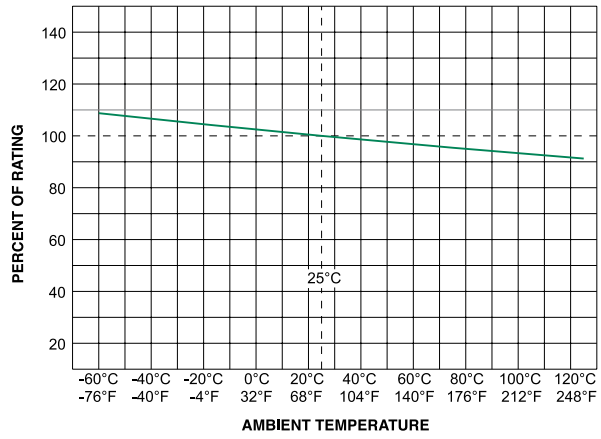
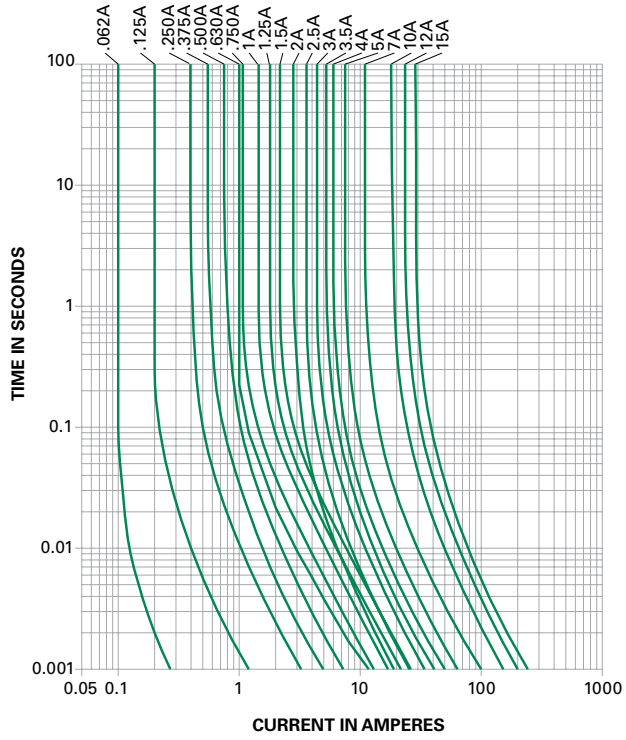
Temperature Re-rating Curve



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

Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation for 251 Series only
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand Soldering Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process

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Axial Lead & Cartridge Fuses

PICO® II > Very Fast-Acting Fuse > 251/253 Series

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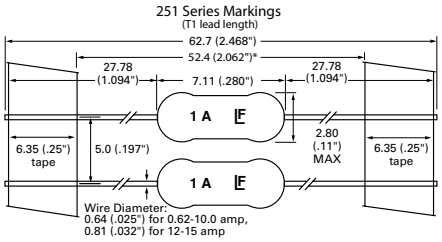
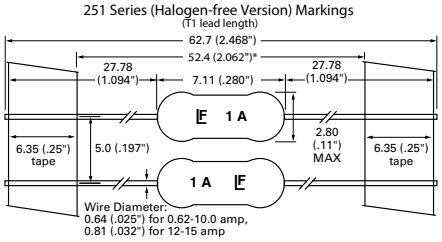
Product Characteristics

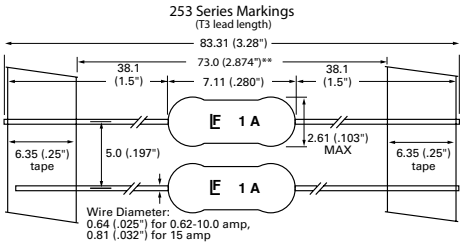
Materials	Encapsulated, Epoxy-Coated **Body:** Pure Tin-coated Copper wire leads
Solderability	MIL-STD-202, Method 208
Lead Pull Force	MIL-STD-202, Method 211, Test Condition A (will withstand a 7lbs. axial pull test)
Fuses To MIL SPEC	For fuses to MIL-PRF-23419, FM10 change the series number from 251 to 253
Operating Temperature	–55°C to +125°C (Consider re-rating)

Vibration	MIL-STD-202, Method 201 (10–55 Hz); Method 204, Test Condition C (55–2000 Hz at 10 G's Peak)
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 msecs.)
Insulation Resistance (After Opening):	MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum at 100 volts)
Moisture Resistance	MIL-STD-202, Method 106
Resistance to Soldering Heat	Withstands 60 seconds above 200°C and up to 260°C, maximum
Flammability Rating	UL 94V–0

Dimensions







Part Numbering System

0251 xxxx N R T1 L

Series
251 = Standard type
253 = Military type

Current Rating
Refer to Amp Code column of Electrical Specifications Table

Quantity
N = 5000
P = 2000
M = 1000
H = 100

Type of Packaging
R = Reel
A = Ammo Pack
X = Loose Pack

Lead Length
The default lead length for Ammo pack and Loose pack is now T1 for 251 series, and remains T3 for 253 series, therefore:
T1 = 52.4mm (2.062"), 251 series only*
Blank = 52.4mm (2.062") for 251 series* or 73mm (2.874") for 253 series**

Option Codes
L = RoHS + HF
(Only applies to 251 Series)

Packaging

Packaging Option	Packaging Specification	Quantity & Packaging Code
*T1: 52.4mm (2.062") Tape and Reel	EIA 296	Please refer to available quantities above in "Part Numbering System"
**T3: 73mm (2.874') Tape and Reel	EIA 296	

The default lead length for both ammo pack and loose pack is T1 for 251 and is T3 for 253.

Notes: * T1 dimension is defined as the length of the component between the two tapes. The full component length is 62.7mm (2.468"). **T1 length is for 251 series only.**
** T3 dimension is defined as the length of the component between the two tapes. The full component length is 83.3.7mm (3.28"). **T3 length is for 253 series only.**

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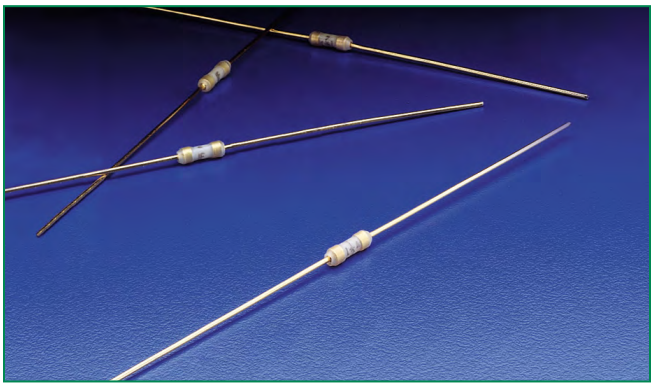
275 Series, PICO® Very Fast-Acting Fuse



Description

The PICO® Very Fast-Acting Fuse is designed to meet an extensive array of performance characteristics in a space-saving subminiature package.

Features

- Very fast-acting
- Small size
- High current rating (20A- 30A)
- RoHS compliant
- Wide operating temperature range
- Low temperature rerating

Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	20A - 30A

Applications

- Power supply
- PC server
- Networking equipment
- Storage system

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

% of Ampere Rating	Ampere Rating	Opening Time
100%	20 - 30	4 Hours, **Min.**
200%	20 - 30	10 Seconds, **Max.**

Electrical Characteristics

Ampere Rating (A)	Amp Code	Ordering Number	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals
20.0	020.	0275020.	32	300A@32VDC 100A@32VAC	0.0033	203	x
25.0	025.	0275025.	32		0.0024	288	x
30.0	030.	0275030.	32		0.0020	355	x

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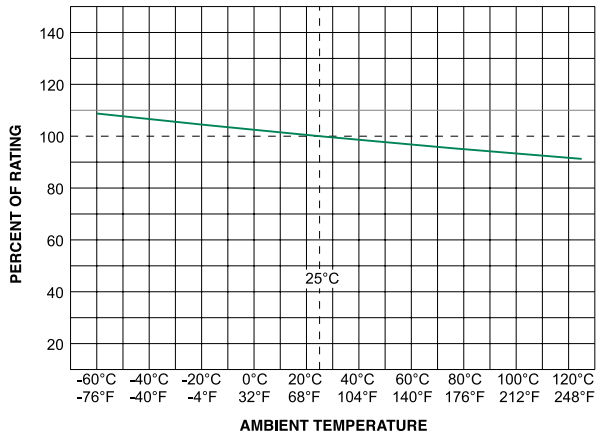
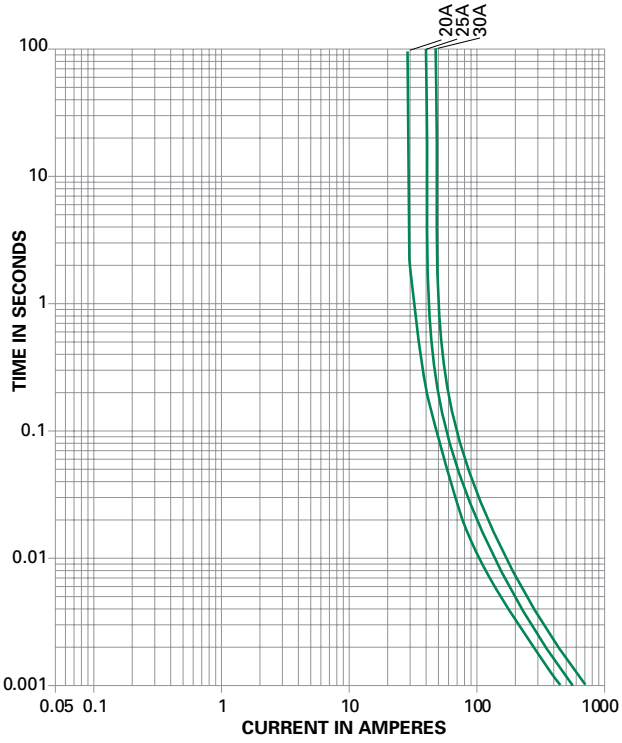
Temperature Re-rating Curve



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

Average Time Current Curves



Soldering Parameters

Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

PICO® > Very Fast-Acting Fuse > 275 Series

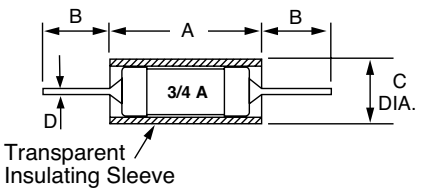
Product Characteristics

Materials	Transparent Polyvinylidene Fluoride sleeve covered body, pure tin plated copper wire leads
Solderability	MIL-STD-202, Method 208
Lead Pull Force	MIL-STD-202, Method 211, Test Condition A (will withstand a 5lbs. axial pull test)

Operating Temperature	–55°C to +125°C (Consider re-rating)
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds) and per method 2028 (78G's peak for 11 milliseconds)
Vibration	MIL-STD-202, Method 201 (10–55 Hz); Method 204, Test Condition D (Vibrations of 10-2000 cps at 20 G's)
Moisture Resistance	MIL-STD-202, Method 106

Dimensions

275 000 **Series**



Amperage	Dimensions in mm (inches)			
	A	B	C	D
20 - 30	7.87 (.31")	27.78 (1.094")	3.38 (.133")	1.016 (.040")

Part Numbering System

0275 xxxx M R T1 L

Series
275

Current Rating
Refer to Amp Code column of Electrical Characteristics Table

Quantity
M = 1000
V = 5

Type of Packaging
R = Reel
X = Loose Pack

Lead Length
T1 = 52.4mm (2.062")
Blank = For Loose pack (MXL,VXL)

RoHS
Only RoHS parts are available for 275 Series

Packaging

Packaging Option	Packaging Specification	Quantity & Packaging Code
T1: 52.4mm (2.062") Tape and Reel	EIA 296	Please refer to available quantities above in "Part Numbering System"

The default lead length for loose pack is T1.

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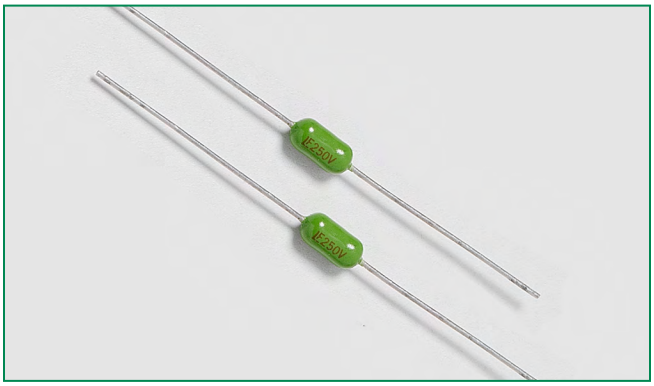
263 Series, PICO® II 250 Volt Fuse, Very Fast Acting



Description

The PICO® II 263 Series Fuse is a specially designed axial leaded fuse that achieves a 250V rating in a small package.

Features

- 250V rating
- Very fast–acting
- Small size
- Wide range of current rating available (62mA to 5A)
- RoHS compliant and Halogen-free
- Wide operating temperature range
- Low temperature rerating

Applications

- Lighting system
- Power supply
- LCD/PDP TV
- LCD monitor
- Office automation machines
- Audio/Video system
- Medical equipment

Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0.062 - 5A
	PSE_NBK200416-JP1021	1A - 5A
	29862	0.125 - 5A

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 Hours, **Min.**
200%	1 Second, **Max.**
300%	0.1 Second, **Max.**

Electrical Characteristics

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Nom Voltage Drop (mV)	Agency Approvals		
0.062	.062	250	50A@250VAC PSE: 100A@ 125VAC	5.50	0.000192	0.74	x		
0.125	.125	250		1.745	0.00251	0.3	x		x
0.250	.250	250		0.715	0.0165	0.235	x		x
0.375	.375	250		0.391	0.0444	0.195	x		x
0.500	.500	250		0.252	0.084	0.302	x		x
0.750	.750	250		0.150	0.0411	0.176	x		x
1.00	001.	250*		0.105	0.087	0.165	x	x	x
1.50	01.5	250*		0.0635	0.2958	0.148	x	x	x
2.00	002.	250*		0.0444	0.74	0.137	x	x	x
2.50	02.5	250*		0.0340	1.197	0.128	x	x	x
3.00	003.	250*		0.0274	1.77	0.1225	x	x	x
3.50	03.5	250*		0.0224	2.33	0.1175	x	x	x
4.00	004.	250*		0.0193	3.08	0.1125	x	x	x
5.00	005.	250*		0.0145	5.55	0.1065	x	x	x

* PSE Approval has max. voltage range of 125VAC.

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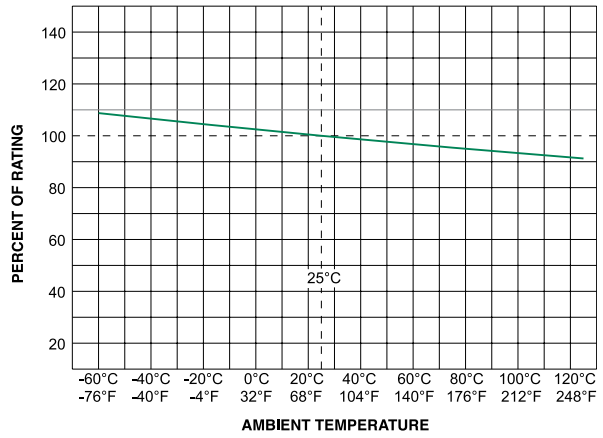
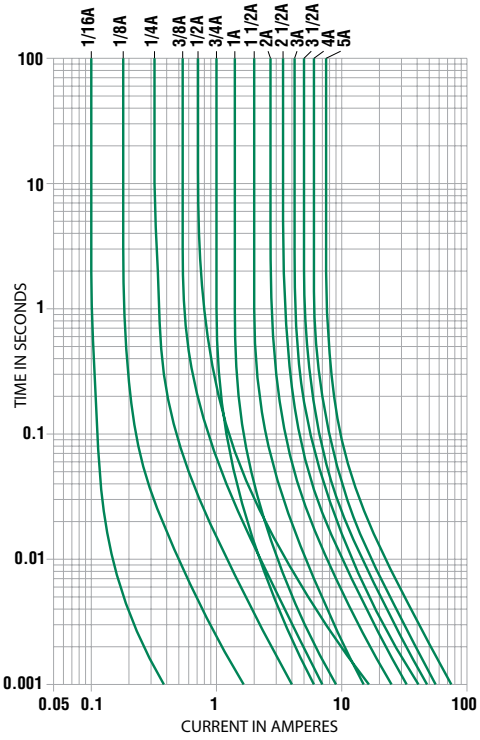
Revised: 03/03/17

Temperature Re-rating Curve



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

Average Time Current Curves



Soldering Parameters

Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100° C
Temperature Maximum:	150° C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260° C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350° C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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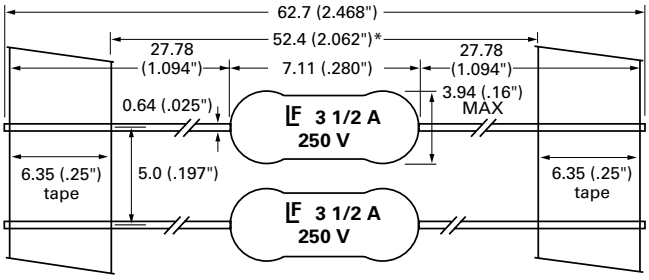
Revised: 03/03/17

Product Characteristics

Materials	Encapsulated, Epoxy-Coated Body: Solder Coated Copper Leads. RoHS compliant Product: Pure Tin–coated Copper wire leads
Solderability	MIL-STD-202. Method 208.
Product Marking	Body marking, current rating and logo
Operating Temperature	–55°C to +125°C (Consider re-rating)
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)

Vibration	MIL-STD-202, Method 201 (10–55 Hz); MIL-STD-202, Method 204, Test Condition C (55–2000 Hz at 10 G's Peak)
Salt Spray	MIL-STD-202, Method 101, Test Condition B (48 hrs.)
Insulation Resistance (After Opening):	MIL-STD-202, Method 302, Test Condition A (10,000 ohms minimum at 100 volts)
Resistance to Soldering Heat	MIL-STD-202, Method 210, Test Condition C (10 sec. at 260°C)
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (–55°C to 125°C)
Moisture Resistance	MIL-STD-202, Method 106
Lead Pull Force	MIL-STD-202, Method 211, Test Condition A (will withstand 7 lb. axial pull test)

Dimensions



Part Numbering System

0263 xxxx W R T1 L

Series

Current Rating
Refer to Amp Code column of Electrical Characteristics Table

Quantity
W = 3000
M = 1000
H = 100

Type of Packaging
R = Reel
A = Ammo Pack
X = Loose Pack

Lead Length
T1: 52.4mm (2.062")*

RoHS + HF

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
T1: 52.4mm (2.062") Tape and Reel	EIA 296	Please refer to available quantities above in "Part Numbering System"	

Notes: * T1 dimension is defined as the length of the component between the two tapes. The full component length is 62.7mm (2.468").

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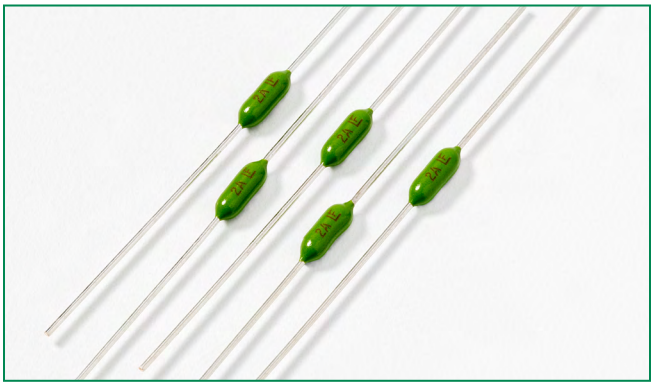
471 Series, PICO® II Time-Lag Fuse



Description

The 471 Series PICO® II Time-Lag Fuse is designed for applications that require moderate in–rush withstand and is in a space-saving subminiature package.

Features

- Moderate in–rush withstand
- Small size
- Wide range of current ratings available (0.500A to 5A)
- RoHS compliant
- Halogen-free available
- Wide operating temperature range
- Low temperature de-rating

Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0.500A - 5A
	29862	0.500A - 2.5A
	JET 1896-31007-1004	1A - 5A

Applications

- Flat–panel display TV
- LCD monitor
- Lighting systems
- Medical equipments
- Industrial equipments

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 Hours, **Min.**
200%	120 Seconds, **Max.**

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals		
.500	.500	125	50A@125VAC/DC	0.1890	0.159	X	X	
1.00	001.	125		0.0851	0.722	X	X	X
1.50	01.5	125		0.5350	1.610	X	X	X
2.00	002.	125		0.3850	2.500	X	X	X
2.50	02.5	125		0.0300	4.390	X	X	X
3.00	003.	125		0.0231	6.960	X		X
3.50	03.5	125		0.0180	9.900	X		X
4.00	004.	125		0.1310	10.600	X		X
5.00	005.	125		0.0084	15.400	X		X

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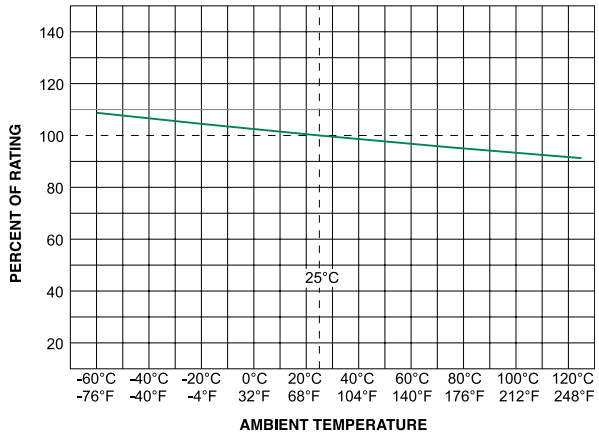
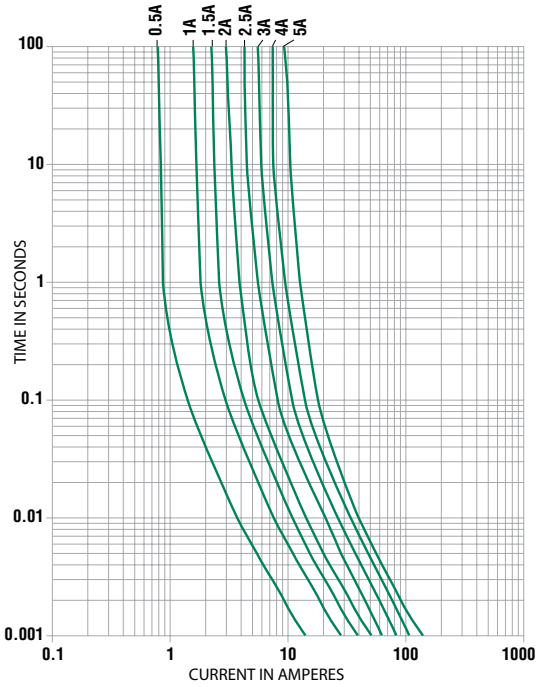
Temperature Re-rating Curve



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

Average Time Current Curves



Soldering Parameters

Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

PICO® II > Time-Lag Fuse > 471 Series

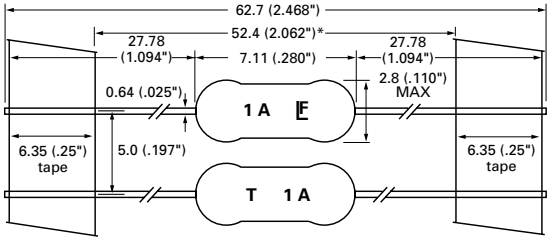
Product Characteristics

Materials	Encapsulated, Epoxy-Coated Body; Solder Coated Copper wire leads; RoHS compliant Product: Pure Tin-coated Copper wire leads
Flammability Rating	UL 94V-0
Solderability	MIL-STD-202, Method 208
Lead Pull Force	MIL-STD-202, Method 211, Test Condition A (will withstand a 7 lbs. axial pull test)

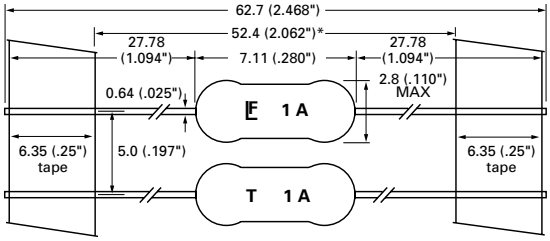
Operating Temperature	–55°C to +125°C (Consider re-rating)
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)
Vibration	MIL-STD-202, Method 201 (10–55 Hz); Method 204, Test Condition C (55–2000 Hz at 10 G's Peak)
Moisture Resistance	MIL-STD-202, Method 106
Resistance to Soldering Heat	Withstands 60 seconds above 200°C and up to 260°C, maximum

Dimensions

471 Series (RoHS Version) Markings



471 Series (RoHS and Halogen-free Version) Markings



Part Numbering System

0471 xxxx N R T1 L

Series

Current Rating
Refer to Amp Code column of Electrical Characteristics Table

Quantity
N = 5000
P = 2000

Type of Packaging
R = Reel
A = Ammo Pack

Lead Length
T1: 52.4mm (2.062")*

RoHS + HF

Packaging

Packaging Option	Packaging Specification	Quantity & Packaging Code
*T1: 52.4mm (2.062") Tape and Reel	EIA 296	Please refer to available quantities above in "Part Numbering System"

Notes: * T1 dimension is defined as the length of the component between the two tapes. The full component length is 62.7mm (2.468").

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472 Series, PICO® II Slo-Blo® Fuse

HF RoHS

Description

The 472 Series PICO® II, 125V rated Slo-Blo® Fuse is designed for applications that require moderate in-rush withstand and is in a space-saving subminature package.

Features

- Moderate in–rush withstand
- Small size
- Wide range of current ratings available (0. 50A to 5A)
- RoHS compliant and Halogen-free
- Wide operating temperature range
- Low temperature rerating

Applications

- Flat–panel display TV
- Lighting
- Game Console
- Power Supply
- Audio/Video Equipment

Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0. 50A - 5A

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 Hours, **Min.**
200%	120 Seconds, **Max.**

Electrical Characteristics

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals
.500	.500	125	50A@125VAC/DC	0.1745	0.1927	x
1.00	001.	125		0.0785	0.9384	x
1.50	01.5	125		0.0392	2.4081	x
2.00	002.	125		0.0271	4.2363	x
2.50	02.5	125		0.0209	7.0838	x
3.00	003.	125		0.0187	9.3600	x
5.00	005.	125		0.0084	45.9000	x

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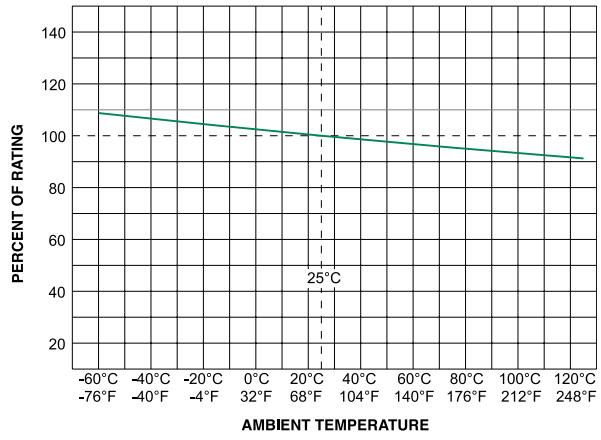
Temperature Re-rating Curve



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

Soldering Parameters

Recommended Process Parameters:

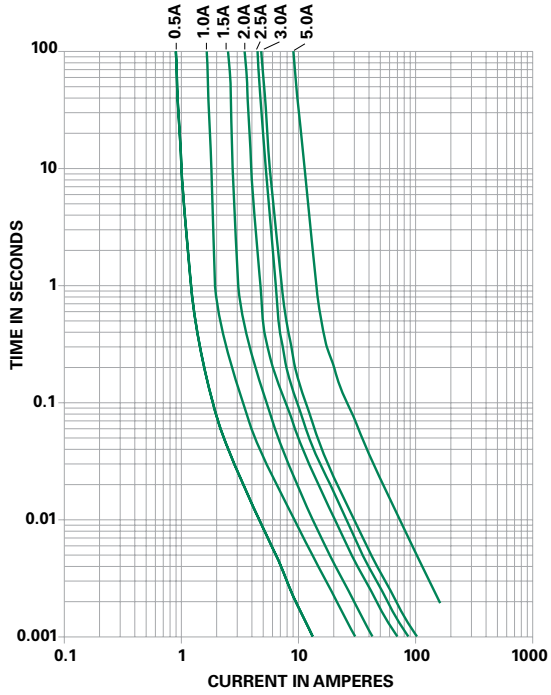
Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Average Time Current Curves



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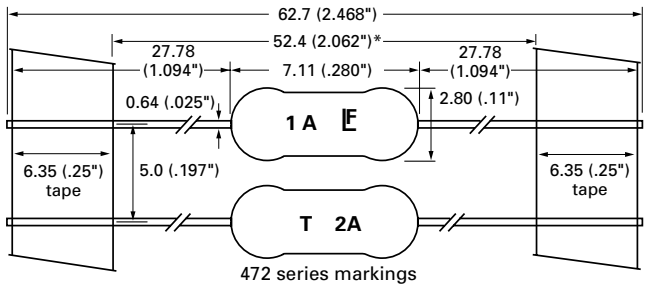
Product Characteristics

Material	Body: Ceramic Leads: Tin-coated Copper Encapsulated: Epoxy-Coated Body
Product Marking	Body: Brand Logo, Current Rating, T (time-lag fuse)
Solderability	MIL-STD-202, Method 208
Lead Pull Force	MIL-STD-202, Method 211, Test Condition A (will Withstand a 7lbs. Axial pull test)

Operating Temperature	–55°C to +125°C with proper de–rating
Thermal Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)
Vibration	MIL-STD-202, Method 201 (10-55 Hz); Method 204, Test Condition C (55-2000 Hz at 10 G's Peak)

Dimensions



472 series markings

Coating Diameter (max): 0.5A-3.0A: 2.80mm
5.0A: 2.90mm

Part Numbering System

0472 xxxx N R T1 L

Series

Current Rating
Refer to Amp Code column of Electrical Characteristics Table

Quantity
N = 5000
M = 1000

Type of Packaging
R = Reel
A = Ammo Pack
X = Loose Pack

Lead Length
T1: 52.4mm (2.062")*

RoHS + HF

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
*T1: 52.4mm (2.062") Tape and Reel	EIA 296	Refer to the tables in Part Numbering System above	

Notes: * T1 dimension is defined as the length of the component between the two tapes. The full component length is 62.7mm (2.468").

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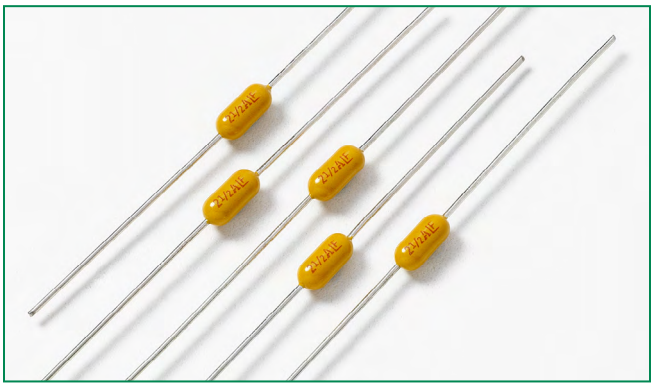
473 Series, PICO® II Slo-Blo® Fuse



Description

The PICO® II Slo-Blo® Fuse combines time-delay performance characteristics with the proven reliability of a PICO® Fuse.

Features

- Enhanced inrush withstand
- Small size
- Wide range of current ratings (0.375A - 7A)
- Halogen free and RoHS complaint
- Wide operating temperature range
- Low temperature rerating

Applications

- Flat–panel Display TV
- LCD monitor
- Lighting system
- Medical equipment
- Industrial equipment

Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0.375A - 7A
	29862	0.375A - 7A
	PSE_NBK200416-JP1021	1A - 5A

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 Hours, **Min.**
200%	1 Sec., **Min.**; 60 Sec., **Max.**
300%	0.2 Sec., **Min.**; 3 Sec., **Max.**
800%	0.02 Sec., **Min.**; 0.1 Sec., **Max.**

Electrical Characteristics

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Nom Voltage Drop (mV)	Agency Approvals		
0.375	.375	125	50A@125VAC/DC	1.7550	0.085	0.840	X	X	
0.500	.500	125		1.1370	0.210	0.775	X	X	
0.750	.750	125		0.4900	0.760	0.429	X	X	
1.00	001.	125		0.3000	2.010	0.353	X	X	X
1.50	01.5	125		0.1170	3.940	0.208	X	X	X
2.00	002.	125		0.0720	7.600	0.180	X	X	X
2.25	2.25	125		0.0640	9.280	0.164	X	X	X
2.50	02.5	125		0.0520	13.00	0.153	X	X	X
3.00	003.	125		0.0380	21.00	0.140	X	X	X
3.50	03.5	125		0.0240	26.80	0.094	X	X	X
4.00	004.	125		0.0200	35.00	0.086	X	X	X
5.00	005.	125		0.0133	54.80	0.074	X	X	X
7.00	007.	125		0.0092	105.00	0.070	X	X	

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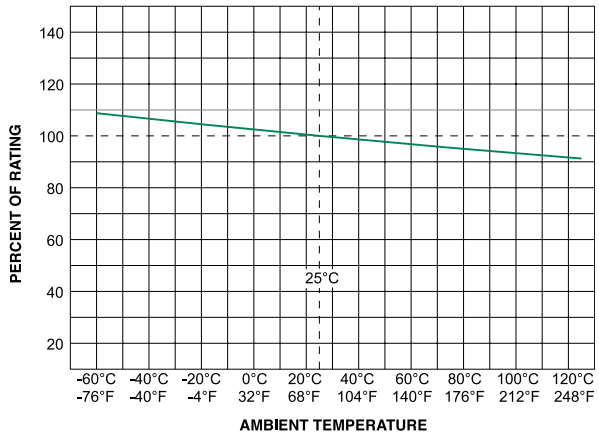
Temperature Re-rating Curve



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

Soldering Parameters

Recommended Process Parameters:

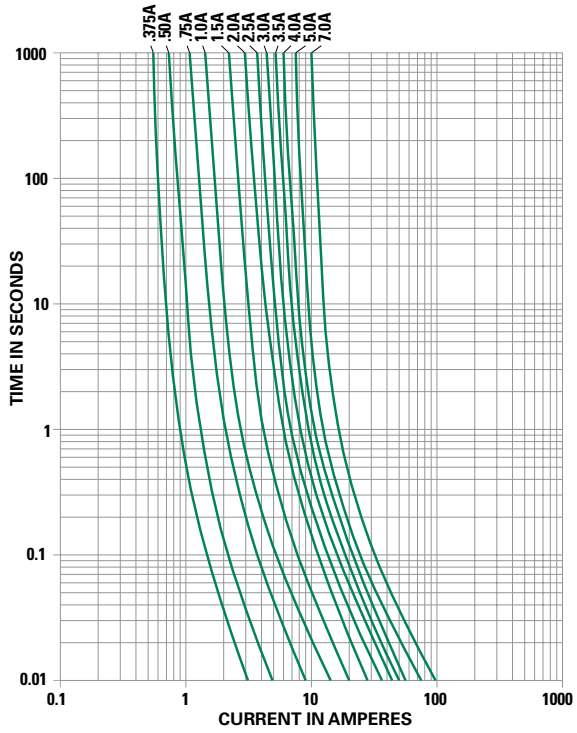
Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Average Time Current Curves



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Axial Lead & Cartridge Fuses

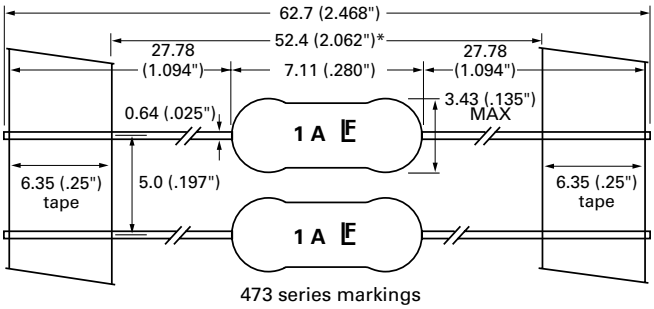
PICO® II > Slo-Blo® Fuse > 473 Series

Product Characteristics

Materials	Encapsulated, Epoxy-Coated Body; Solder Coated Copper wire leads; RoHS compliant Product: Pure Tin-coated Copper wire leads
Solderability	MIL-STD-202, Method 208
Lead Pull Force	MIL-STD-202, Method 211, Test Condition A (will withstand 7 lbs. axial pull test)
Operating Temperature	–55˚C to +125°C (Consider re-rating)
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds)

Vibration	MIL-STD-202, Method 201 (10–55 Hz); MIL-STD-202, Method 204, Test Condition C (55–2000 Hz at 10 G's Peak)
Salt Spray	MIL-STD-202, Method 101, Test Condition B
Insulation Resistance (After Opening):	MIL-STD-202, Method 302, (10,000 ohms minimum at 100 volts)
Resistance to Soldering Heat	MIL-STD-202, Method 210, Test Condition C (20 sec at 260°C)
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (–65°C to 125°C)
Moisture Resistance	MIL-STD-202, Method 106 (90–98% RH), Heat (65°C)

Dimensions



473 series markings

Part Numbering System

0473 xxxx Y R T1 L

Series

Current Rating
Refer to Amp Code column of Electrical Characteristics Table

Quantity
Y = 4000
P = 2000
M = 1000

Type of Packaging
R = Reel
A = Ammo Pack
X = Loose Pack

Lead Length
T1: 52.4mm (2.062")*

RoHS + HF

Packaging

Packaging Option	Packaging Specification	Quantity & Packaging Code
*T1: 52.4mm (2.062") Tape and Reel	EIA 296	Please refer to available quantities above in "Part Numbering System"

Notes: * T1 dimension is defined as the length of the component between the two tapes. The full component length is 62.7mm (2.468").

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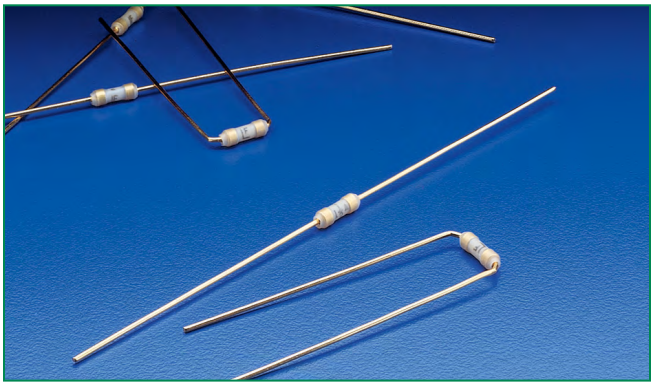
265/266/267 Series, PICO® Very Fast-Acting Fuse (High-Reliability)

RoHS QPL



Description

The 265/266/267 Series are high–reliability PICO® Fuses, that are very fast-acting, with an insulating sleeve. **These fuses provide supplemental protection in end-use equipment to provide protection for components or internal circuits. They are not suitable for branch or feeder circuit use.** The Military version of the 265 Series (except 1/16 ampere rating) is available in FM08A on QPL for MIL-PRF-23419/8. To order, change 265 to 267.

Features

- Military grade available
- RoHS compliant
- Available from 0.062A to 15A
- Available in axial and radial leaded
- Available in miniature and subminiature formats

Agency Approvals

Agency	Agency File Number	Ampere Range	Series
CSA	29862	0.062 - 10A	265/266
QPL	FM08A	0.062 - 10A	267

Electrical Characteristics

% of Ampere Rating	Ampere Rating	Opening Time
100%	1/16–15	4 Hours, **Min.**
200%	1/16–7	1 Second, **Max.**
	10	3 Second, **Max.**
	15	10 Second, **Max.**

Electrical Characteristics

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Agency Approvals	
					CSA	QPL
0.062	.062	125	300A@125VDC 50A@125VAC	6.9900	X	X
0.125	.125	125		2.1000	X	X
0.250	.250	125		0.7100	X	X
0.375	.375	125		0.4200	X	X
0.500	.500	125		0.2800	X	X
0.750	.750	125		0.1700	X	X
1.00	001.	125		0.1250	X	X
1.50	01.5	125		0.0800	X	X
2.00	002.	125		0.0550	X	X
2.50	02.5	125		0.0420	X	X
3.00	003.	125		0.03515	X	X
4.00	004.	125		0.0230	X	X
5.00	005.	125		0.0140	X	X
7.00	007.	125		0.0100	X	X
10.0	010.	125		0.00645	X	X
15.0	015.	32	300A@32VDC 50A@32VAC	0.0040	X	X

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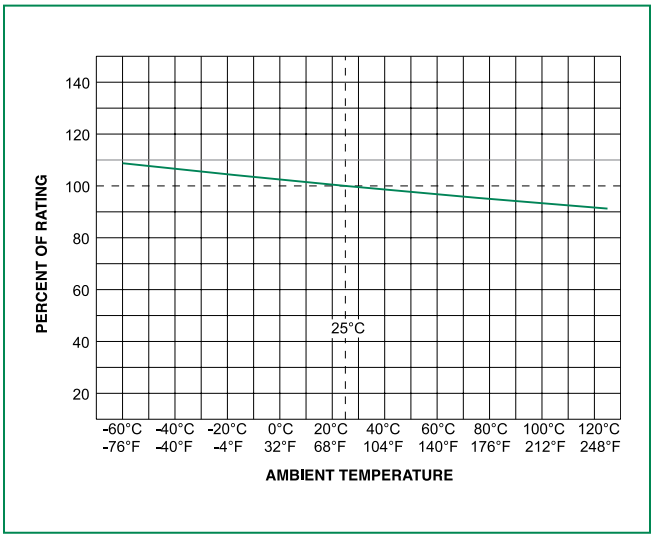
Revised: 03/03/17

Axial Lead & Cartridge Fuses

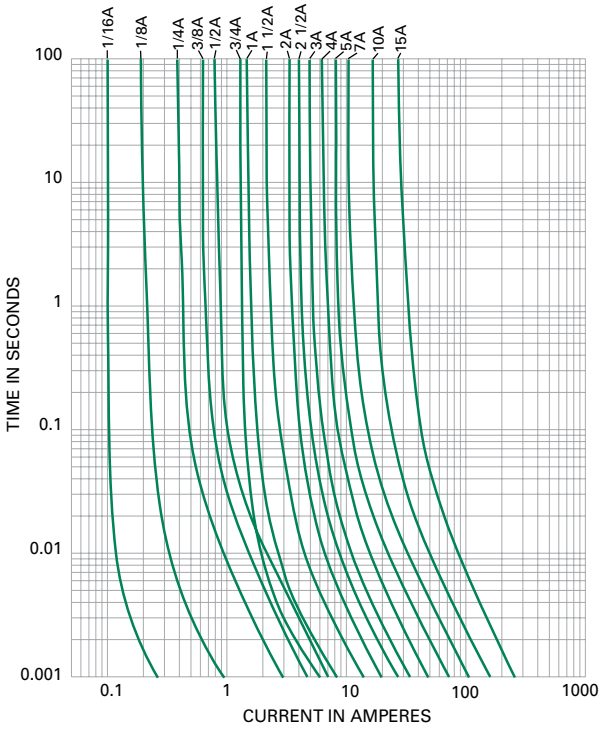
PICO® > Very Fast Acting Fuse > 265/266/267 Series

Temperature Re-rating Curve

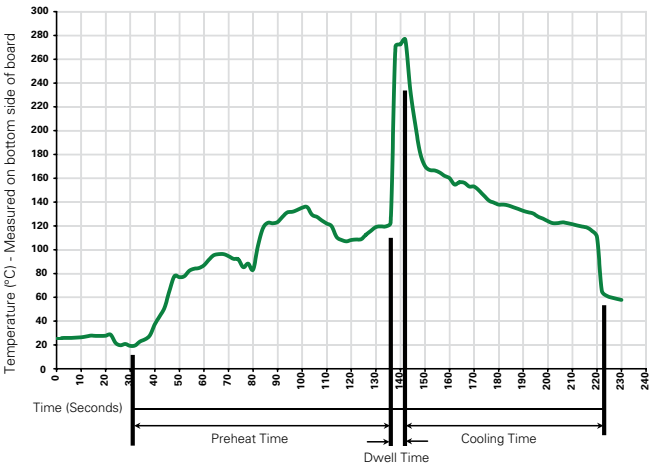


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters\



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	280°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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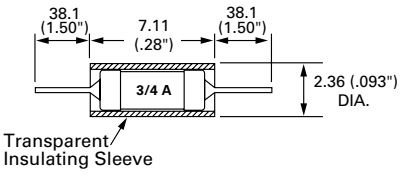
Product Characteristics

Materials	Body: White Thermoplastic Gold-Plated Copper Leads, Type II
Weight	.32 Grams
Solderability	MIL-STD-202, Method 208
Lead Pull Force	MIL-STD-202, Method 211, Test Condition A (will withstand a 5 lbs. axial pull test) AQL (Electrical Characteristics): Certified to 1% AQL
Sampling	Per MIL-STD-105, Inspection Level II. Traceability and Identification Records: Controlled by lot number and retained on file for a minimum of three years. Copies of Lot Certification Test data available when requested with order
Options	Special screening tests, burn-in, etc. can be supplied on special order to meet specific requirements. For information on higher current ratings, contact Littelfuse. 267 series fuses are offered with optional solder coated leads. To order, enter XT as the end suffix (see Part Numbering System section)

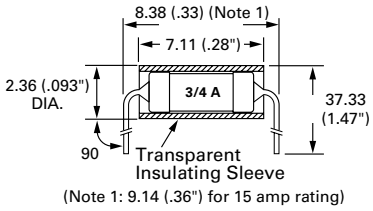
Operating Temperature	–55°C to +125°C
Shock	MIL-STD-202, Method 213, Test Condition I (100 G's peak for 6 milliseconds).
Vibration	MIL-STD-202, Method 201 (10–55 Hz); MIL-STD-202, Method 204, Test Condition C (55–2000 Hz at 10 G's Peak)
Salt Spray	MIL-STD-202, Method 101, Test Condition B
Seal Test	MIL-STD-202, Method 112, Test Condition A
Insulation Resistance (After Opening)	MIL-STD-202, Method 302, Test Condition A (1/2 Megohm minimum)
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (–65°C to 125°C).
Moisture Resistance	MIL-STD-202, Method 106
Fuses To MIL SPEC	265 Series (except 1/16 ampere rating) is available as FM08A on QPL for MIL-PRF-23419/8. To order, change 265 to 267

Dimensions

265 000 Series



266 000 Series



(Note 1: 9.14 (.36") for 15 amp rating)

Part Numbering System

0267 xxxx V XT

Series
0265 - Standard Series with straight leads
0266 - Standard Series with bent leads
0267 - Military Grade with straight leads

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Lead Option Code
Blank = (All series) standard lead
XT = (267 series only) solder coated lead option

Quantity & Packaging Code
V = (All series) 5 quantity bulk pack

Packaging

Packaging Option	Quantity	Quantity & Packaging Code
Bulk Pack	5	V

Additional Information

Datasheet 265 Series	**Resources 265 Series**	**Samples 265 Series**
Datasheet 266 Series	**Resources 266 Series**	**Samples 266 Series**
Datasheet 267 Series	**Resources 267 Series**	**Samples 267 Series**

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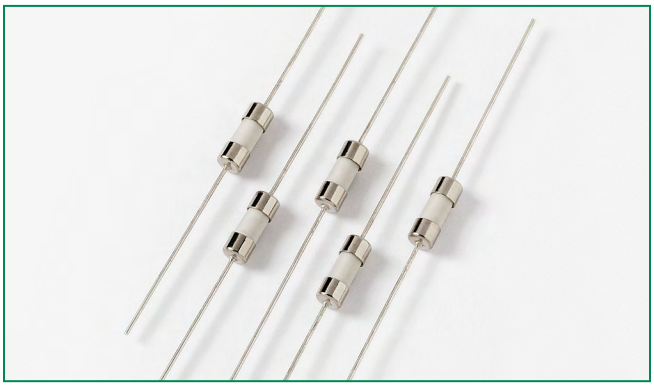
Revised: 03/03/17

874 Series Fuse, Lead-free 3.6×10 mm, Fast–Acting Fuse



Description

Single Pigtail Axial Lead 3.6 ×10mm Fast-Acting Fuse

Features

- Designed to UL/CSA 248 Standard
- Fast-Acting, Ceramic body fuse in a compact package
- Single Pigtail Axial Lead format
- Pb-free, RoHS Compliant
- Available in ratings of 0.10 to 10 Amperes

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	0.100A - 10 A

Applications

This space saving fuse is ideally suited for lighting, power supply, and adapter applications.

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	5 seconds, Maximum

Electrical Characteristics

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals UL
.100	0.100	250	50A @ 250 VAC	3.000	0.0010	x
.125	0.125	250		2.0600	0.0039	x
.200	0.200	250		0.9200	0.0066	x
.250	0.250	250		0.6580	0.030	x
.300	0.300	250		0.4350	0.039	x
.400	0.400	250		0.3655	0.0578	x
.500	0.500	250		0.2964	0.078	x
.600	0.600	250		0.2667	0.100	x
.750	0.750	250		0.2130	0.128	x
.800	0.800	250		0.1600	0.215	x
001.	1.00	250		0.0860	0.406	x
01.5	1.50	250		0.0563	0.974	x
01.6	1.60	250		0.0525	0.973	x
002.	2.00	250		0.0400	1.812	x
02.5	2.50	250		0.0329	2.675	x
3.15	3.15	250		0.0216	5.904	x
004.	4.00	250		0.0195	10.03	x
04.5	4.50	250		0.0146	14.42	x
005.	5.00	250		0.0139	14.58	x
006.	6.00	250		0.0111	23.08	x
06.3	6.30	250		0.01074	22.90	x
06.5	6.50	250		0.0100	35.24	x
007.	7.00	250		0.0099	36.90	x
008.	8.00	250		0.0087	75.63	x
010.	10.00	250		0.0066	70.10	x

Note: Cold resistance measured at less than 10% of rated current at 23°C.

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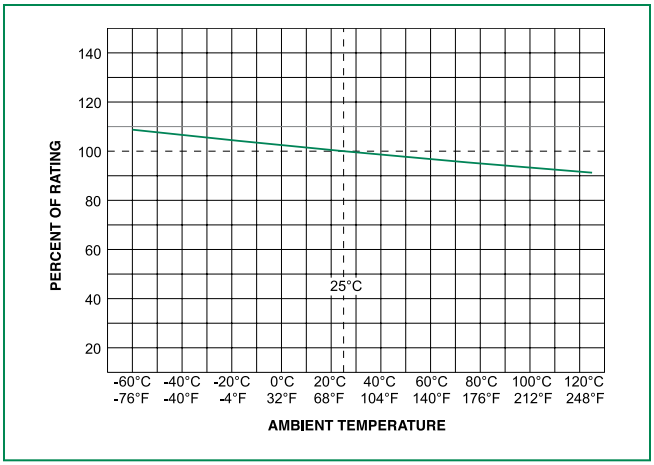
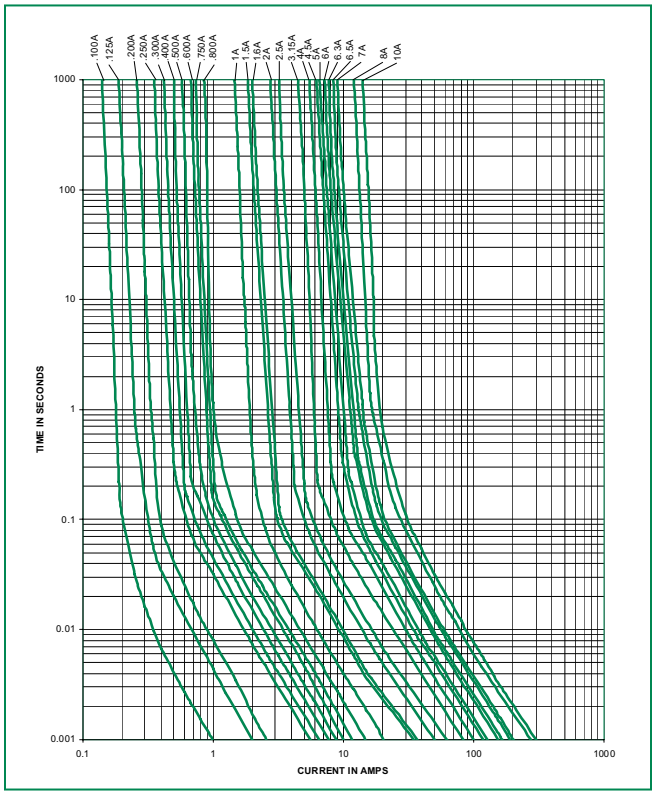
Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

Temperature Re-rating Curve

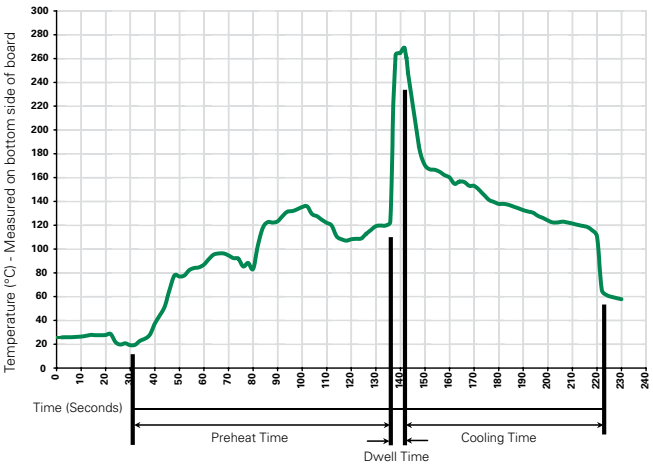


Notes:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

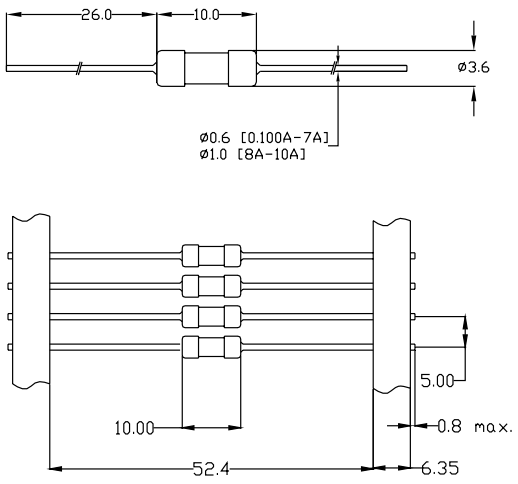
3.6 X 10 mm > Fast-Acting Fuse > 874 Series

Product Characteristics

Materials	Body: Ceramic Cap: Nickel Plated Brass Tin Plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202, Method 208
Product Marketing	Body: Brand Logo, Current Rating Characteristic "F", Agency approval marks
Packaging	Bulk (1000 pcs/pkg) Tape & Reel (1000 pcs/reel)

Operating Temperature	-55°C to 125°C
Thermal Shock	MIL-STD-202, Method 107 Test Condition B3 (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Humidty	MIL-STD-202, Method 106, High Humidity (90-98%RH), Heat (65°C)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions



All dimensions in mm

Part Numbering System

0874 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Code
E = Axial Leaded

Lead-free
P = Lead-Free
Others = Special Options
Please call Littelfuse for detail

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
874 Series				
Bulk	Bulk	1000	MXE	N/A
Tape and Reel	EIA 296	1000	MRET1	T1 = 52mm (2.062")

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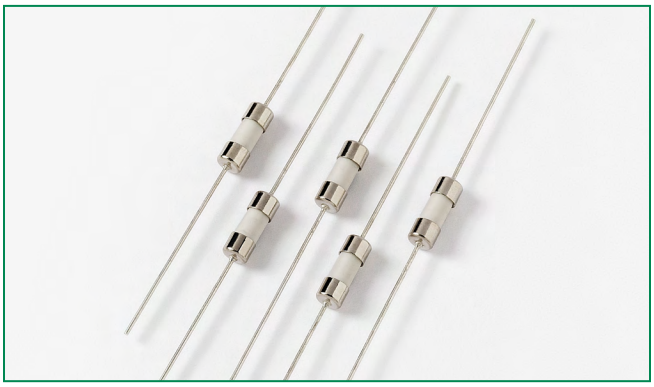
875 Series Fuse, Lead-free 3.6×10 mm, Slo-Blo® Fuse

RoHS



Description

Single Pigtail Axial Lead 3.6×10mm, Slo-Blo® Fuse

Features

- Designed to UL/CSA 248 Standard
- Slo-Blo® Fuse, ceramic body fuse in a compact package
- Single Pigtail Axial Lead format
- Pb-free and RoHS Compliant
- Available in ratings of 0.10 to 10 Amperes

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	0.100A - 10 A

Applications

This space saving fuse is ideally suited for lighting, power supply, and adapter applications.

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
200%	60 seconds, Maximum

Electrical Characteristics

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals UL
.100	0.100	250	50A @ 250 VAC	3.000	0.0023	x
.125	0.125	250		2.060	0.0072	x
.200	0.200	250		0.921	0.0086	x
.250	0.250	250		0.6575	0.038	x
.300	0.300	250		0.435	0.043	x
.400	0.400	250		0.321	0.136	x
.500	0.500	250		0.256	0.288	x
.600	0.600	250		0.151	0.611	x
.800	0.800	250		0.116	0.919	x
001.	1.00	250		0.095	1.503	x
01.5	1.50	250		0.0519	4.33	x
01.6	1.60	250		0.0476	5.08	x
002.	2.00	250		0.02887	8.45	x
02.5	2.50	250		0.02246	17.85	x
003.	3.00	250		0.0171	42.85	x
004.	4.00	250		0.0135	42.45	x
005.	5.00	250		0.00954	60.90	x
006.	6.00	250		0.00891	72.30	x
007.	7.00	250		0.008	106.80	x
008.	8.00	250		0.0077	134.59	x
010.	10.00	250		0.00675	208.00	x

Notes:
Cold resistance measured at less than 10% of rated current at 23°C.

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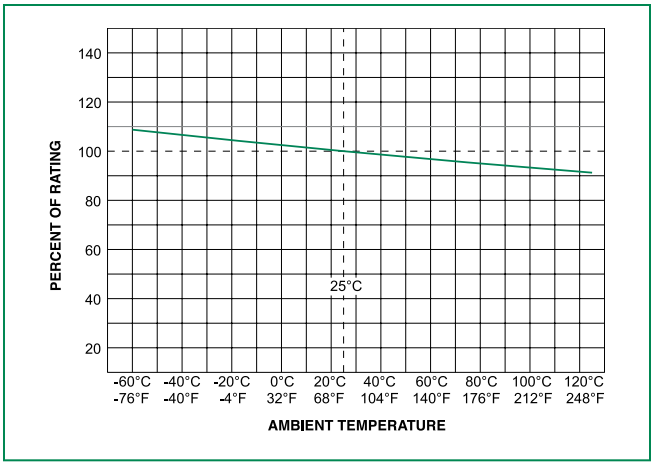
Revised: 03/03/17

Axial Lead & Cartridge Fuses

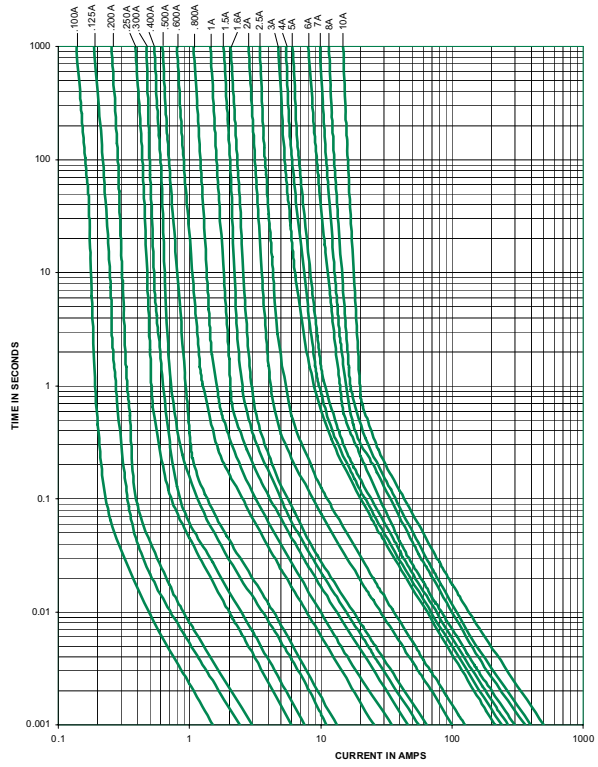
3.6 X 10 mm > Slo-Blo® Fuse > 875 Series

Temperature Re-rating Curve

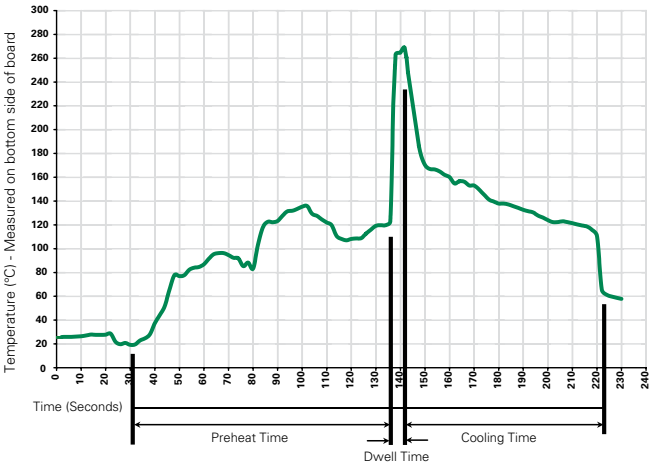


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

3.6 X 10 mm > Slo-Blo® Fuse > 875 Series

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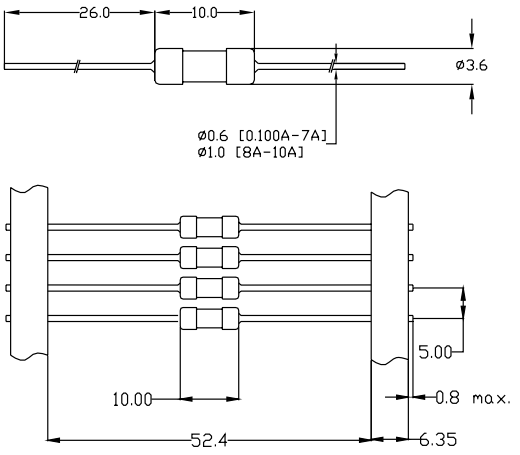
Product Characteristics

Materials	Body: Ceramic Cap: Nickel Plated Brass Tin Plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202, Method 208
Product Marketing	Body: Brand Logo, Current Rating Characteristic "T", Agency approval marks
Packaging	Bulk (1000 pcs/pkg) Tape & Reel (1000 pcs/reel)

Operating Temperature	-55°C to 125°C
Thermal Shock	MIL-STD-202, Method 107 Test Condition B3 (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Humidty	MIL-STD-202, Method 106, High Humidity (90-98%RH), Heat (65°C)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions



All dimensions in mm

Part Numbering System

0875 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Code
E = Axial Leaded

Lead-free
P = Lead-Free
Others = Special Options
Please call Littelfuse for detail

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
875 Series				
Bulk	Bulk	1000	MXE	N/A
Tape and Reel	EIA 296	1000	MRET1	T1 = 52mm (2.062")

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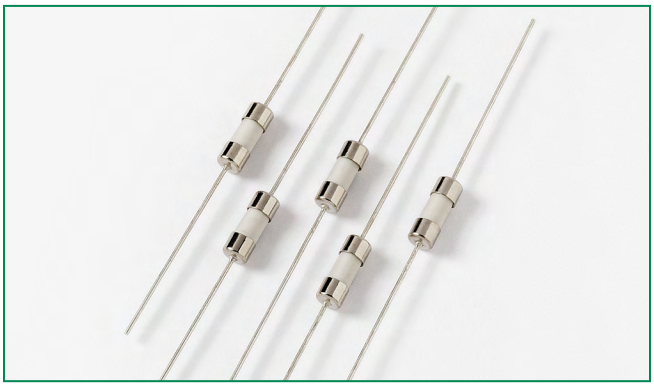
876 Series Fuse, Lead-free 3.6×10 mm, Fast–Acting Fuse



Description

Single Pigtail Axial Lead 3.6 ×10mm Fast-Acting Fuse

Features

- Designed to meet IEC 60127-3 Standard Sheet 3
- Fast-Acting, ceramic body fuse in a compact package
- Single Pigtail Axial Lead format
- Pb-free, RoHS compliant
- Available in ratings of .125 to 5 Amperes

Agency Approvals

Agency	Agency File Number	Ampere Range
VDE	40022494	0.125A, 0.630A - 5A
cULus	E10480	0.125A - 5A
PSE	NBK240212-JP1021	1.6A - 5A
KC	SU05024-11001	0.125A - 0.630A
	SU05024-11002	1.6A - 2A
	SU05024-11003	4A - 5A
CQC	CQC09012035958	0.125A - 5A

Applications

- This space saving fuse is ideally suited for lighting, power supply, and adapter applications.

Electrical Characteristics

% of Ampere Rating	Opening Time
150%	60 minutes, Minimum
210%	30 minutes, Maximum
275%	10 ms., Min.; 3 sec. Max.
400%	3 ms., Min.; 300 ms. Max.
1000%	20 ms. Max.

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Nominal Voltage Drop (mV)	Nominal Power Dissipation (mW)	Agency Approvals				
								VDE	cULus	PSE	KC	CQC
.125	0.125	250	35A @ 250 V AC	1.066	0.020	168	60	x	x		x	x
.160	0.160	250	35A @ 250 V AC	1.000	0.028	183	92		x		x	x
.250	0.250	250	35A @ 250 V AC	0.573	0.110	87	62		x		x	x
.630	0.630	250	35A @ 250 V AC	0.131	0.170	102	221	x	x		x	x
01.6	1.6	250	35A @ 250 V AC	0.0388	1.8	70	382	x	x	x	x	x
002.	2.0	250	35A @ 250 V AC	0.0329	2.51	70	470	x	x	x	x	x
004.	4.0	250	40A @ 250 V AC	0.0149	14.64	70	985	x	x	x	x	x
005.	5.0	250	50A @ 250 V AC	0.0111	26.85	66	1200	x	x	x	x	x

Notes:
Cold resistance measured at less than 10% of rated current at 23°C.

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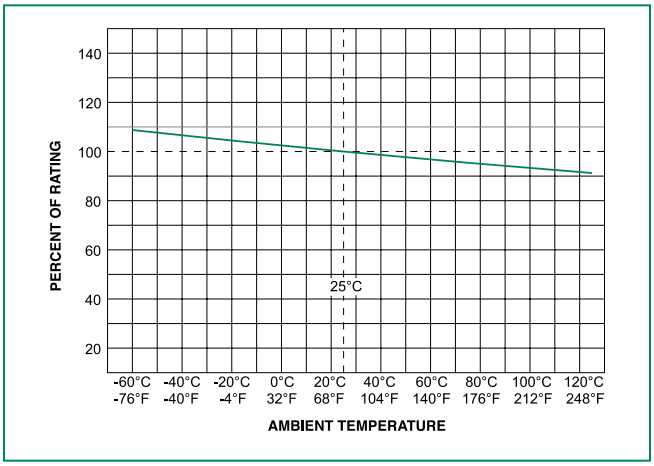
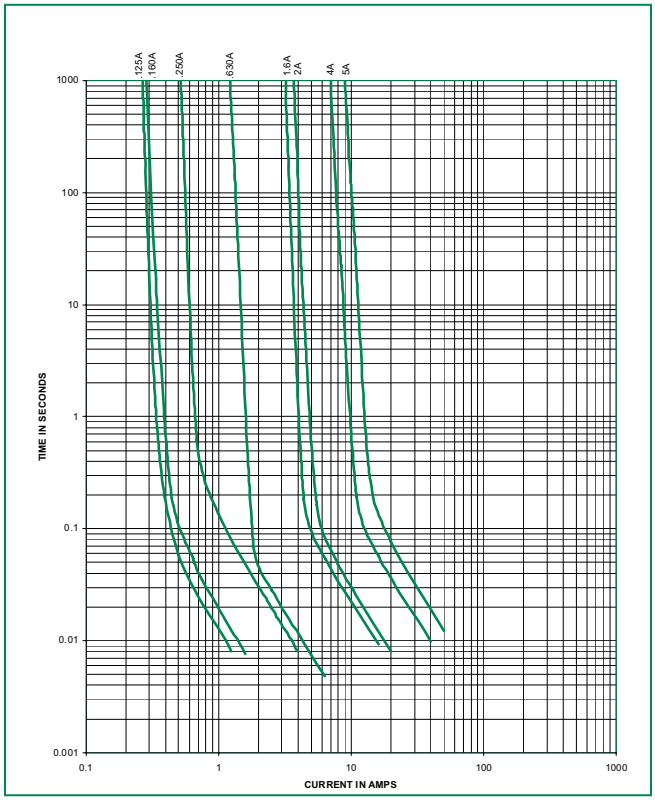
Revised: 03/03/17

Temperature Re-rating Curve

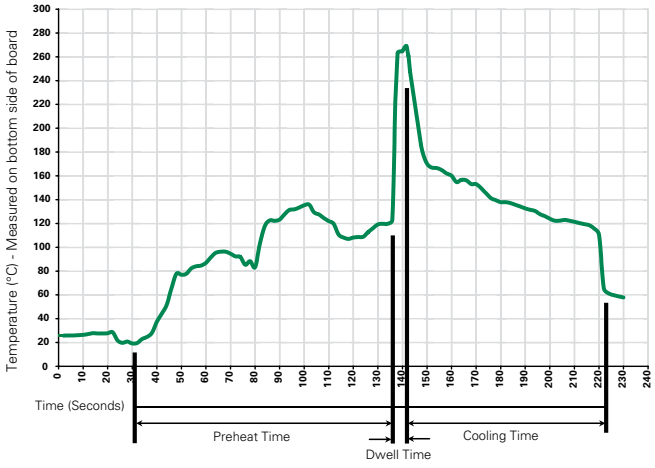


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for ontinuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

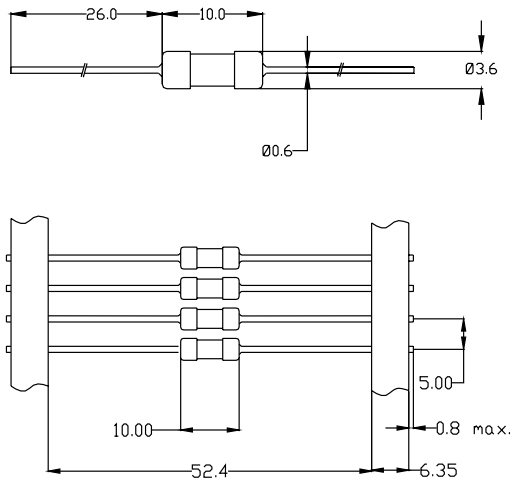
3.6 X 10 mm > Fast-Acting Fuse > 876 Series

Product Characteristics

Materials	Body: Ceramic Cap: Nickel Plated Brass Tin Plated Copper
Terminal Strength	MIL-STD-202 Method 211, Test Condition A
Solderability	Reference IEC 60127 Second Edition 2003-01 Annex A
Product Marketing	Body: Brand Logo, Current Rating Characteristic "F"
Packaging	Bulk (1000 pcs/pkg) Tape & Reel (1000 pcs/reel)

Operating Temperature	-55°C to 125°C
Thermal Shock	MIL-STD-202, Method 107 Test Condition B3 (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Humidty	MIL-STD-202, Method 106, High Humidity (90-98%RH), Heat (65°C)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions



All dimensions in mm

Part Numbering System

0876 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Code
E = Axial Leaded

Lead-free
P = Lead-Free
Others = Special Options
Please call Littelfuse for detail

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
876 Series				
Bulk	Bulk	1000	MXE	N/A
Tape and Reel	EIA 296	1000	MRET1	T1 = 52mm (2.062")

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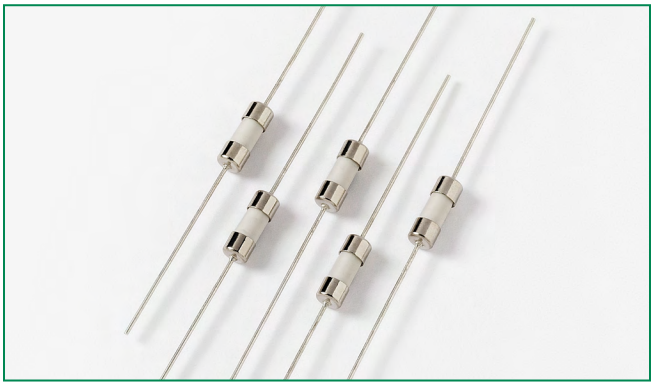
Revised: 03/03/17

877 Series Fuse, Lead-free 3.6 × 10 mm, Time-Lag Fuse



Description

Single Pigtail Axial Lead 3.6×10mm, Time-Lag Fuse

Features

- Designed to meet IEC 60127-3 Standard Sheet 4
- Time-Lag, ceramic body fuse in a compact package
- Single Pigtail Axial Lead format
- Pb-free, RoHS compliant
- Available in ratings of 2 to 6.3 Amperes

Applications

This space saving fuse is ideally suited for lighting, power supply, and adapter applications.

Agency	Agency File Number	Ampere Range
VDE	40023242	2A – 6.3A
c UL us	E10480	2A – 6.3A
CQC	CQC09012029601	2A – 6.3A
KC	SU05024-10002	2A
	SU05024-10001	3.15A - 6.3A
PSE	NBK240212-JP1021	2A – 4A

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

% of Ampere Rating	Opening Time
150%	60 minutes, Minimum
210%	2 minutes, Maximum
275%	400 ms., Min.; 10 sec. Max.
400%	150 ms., Min.; 3 sec. Max.
1000%	20 ms. Min.; 150 ms. Max.

Electrical Characteristics

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Nominal Voltage Drop (mV)	Nominal Power Dissipation (mW)	Agency Approvals				
								VDE	c UL us	PSE	KC	CQC
002.	2.0	250	35A @ 250 V AC	0.035	24.6	82	450	x	x	x	x	x
3.15	3.15	250	35A @ 250 V AC	0.020	67.6	76	690	x	x	x	x	x
004.	4.0	250	40A @ 250 V AC	0.0167	143.4	74	926	x	x	x	x	x
06.3	6.3	250	63A @ 250 V AC	0.0087	190	60	1130	x	x		x	x

Notes:
1. Cold resistance measured at less than 10% of rated current at 23ºC.

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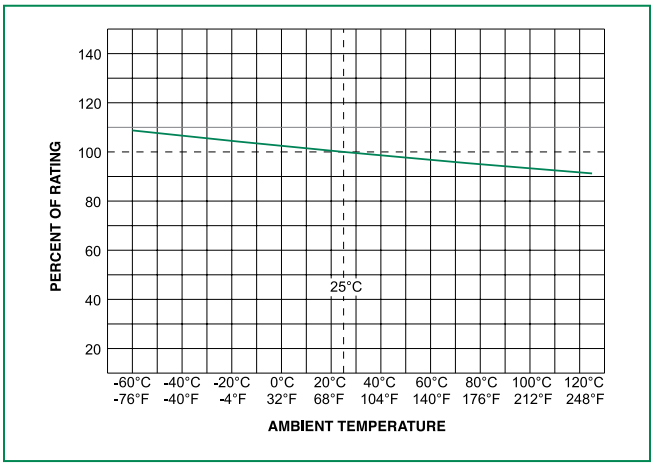
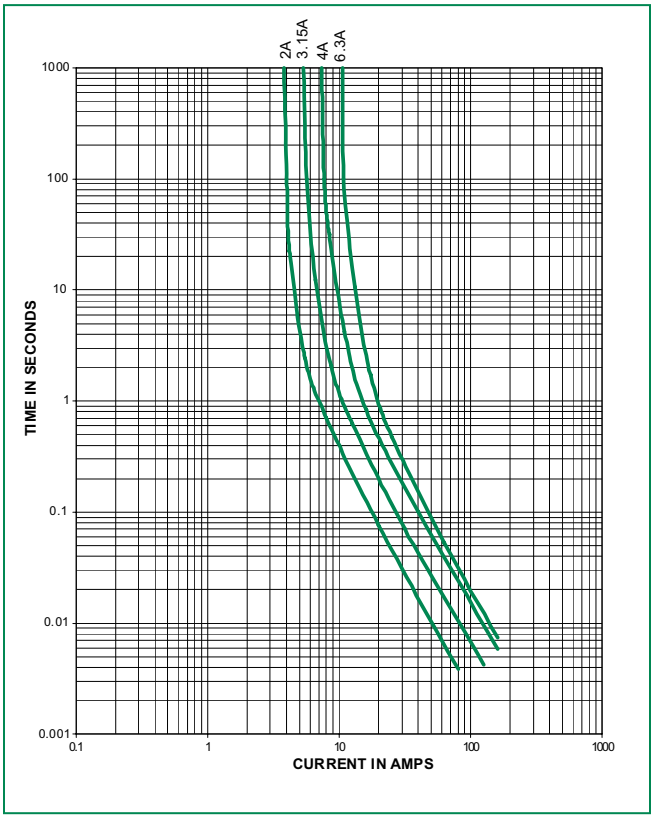
Temperature Re-rating Curve

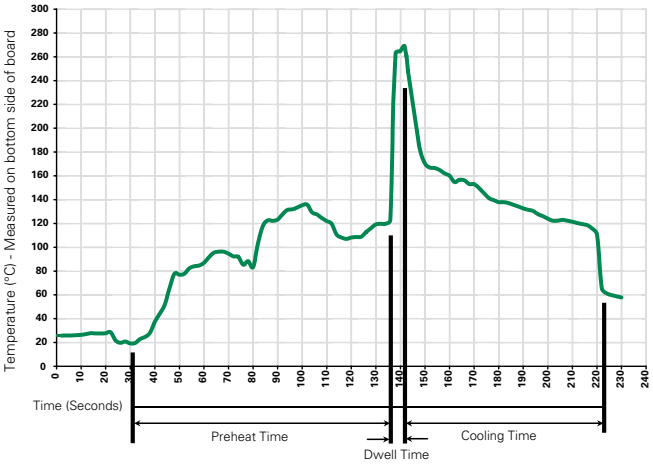


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

3.6 X 10 mm > Time-Lag Fuse > 877 Series

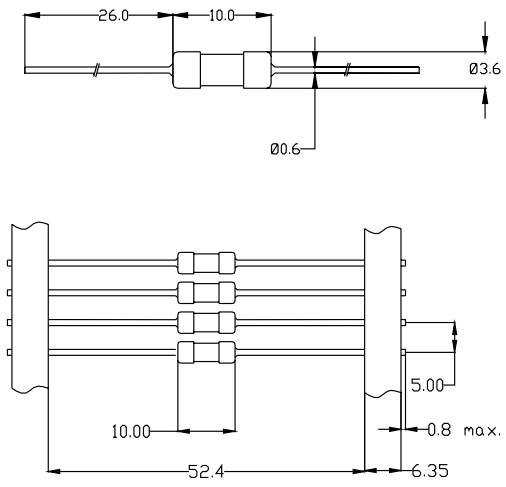
Littelfuse
Expertise Applied | Answers Delivered

Product Characteristics

Materials	Body: Ceramic Cap: Nickel Plated Brass Tin Plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202, Method 208
Product Marketing	Body: Brand Logo, Current Rating Characteristic "T", Agency approval marks
Packaging	Bulk (1000 pcs/pkg) Tape and Reel (1000 pcs/reel)

Operating Temperature	-55°C to 125°C
Thermal Shock	MIL-STD-202, Method 107 Test Condition B3 (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201 (10-55 Hz)
Humidty	MIL-STD-202, Method 106, High Humidity (90-98%RH), Heat (65°C)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions



All dimensions in mm

Part Numbering System

0877 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Code
E = Axial Leaded

Lead-free
P = Lead-Free
Others = Special Options
Please call Littelfuse for detail

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
877 Series				
Bulk	Bulk	1000	MXE	N/A
Tape and Reel	EIA 296	1000	MRET1	T1 = 52mm (2.062")

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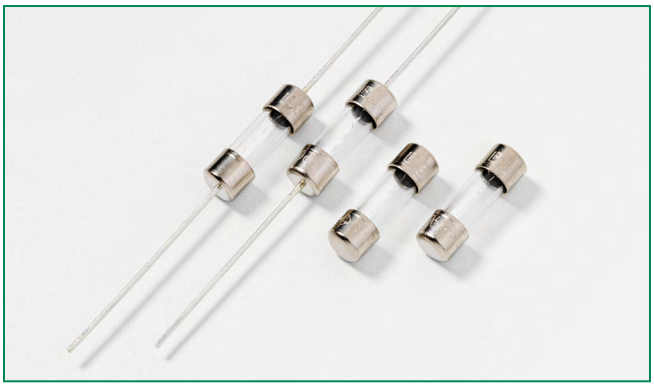
208 Series Lead-Free 2AG, Fast-Acting Fuse



Description

Littelfuse 208 Series (2AG) 350V Fast-Acting Fuses are available in cartridge form or with axial leads. This series provides the same performance characteristics as its 3AG counterpart, while occupying one-third the space. Sleeved fuses are available.

Features

- In accordance with Underwriter's Laboratories Standard UL 248-14
- Available in cartridge and axial lead form and with various lead forming dimensions
- RoHS compliant and Lead-free

Applications

- Electrical ballasts used in fluorescent lighting and other applications

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E10480	0.375A - 10A
PS E	NBK200405-E10480A/B	1A
	NBK200405-E10480C/D	1.5A - 3.5A
	NBK110512-E10480A/B	4A - 5A
	NBK210405-E10480E/F	6A - 10A
CE		0.375A - 10A

Additional Information

Datasheet | **Resources** | **Samples** | **Accessories**

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 Hours, **Min.**
135%	1 Hour, **Max.**
200%	1 Second, **Max.**

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating	Voltage Rating	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals		
						c UL us	PS E	CE
.375	0.375	350	100A @ 350V AC	0.395	0.171	x		x
.500	0.500	350		0.265	0.365	x		x
.750	0.750	350		0.152	1.050	x		x
001.	1.0	350		0.103	2.220	x	x	x
01.5	1.5	350		0.0712	0.800	x	x	x
002.	2.0	350		0.0497	2.169	x	x	x
02.5	2.5	350		0.0372	2.68	x	x	x
003.	3.0	350		0.0317	4.62	x	x	x
03.5	3.5	350		0.0265	6.70	x	x	x
004.	4	350		0.0240	9.40	x	x	x
005.	5	350		0.0186	17.00	x	x	x
006.	6	350		0.0154	22.10	x	x	x
007.	7	350		0.0130	40	x	x	x
008.	8	350		0.0107	56	x	x	x
010.	10	350		0.0075	116	x	x	x

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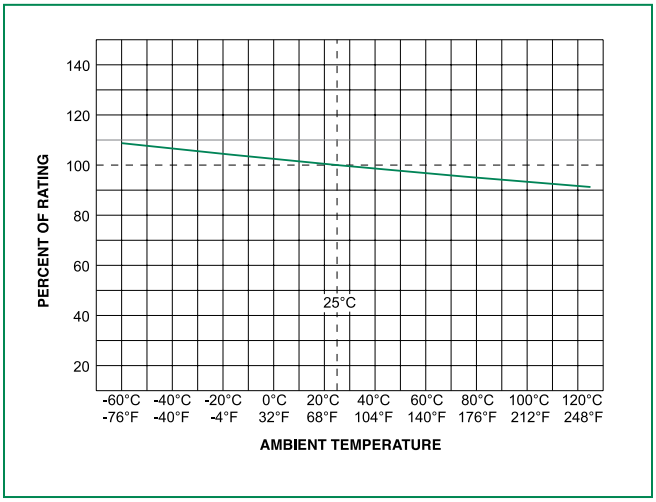
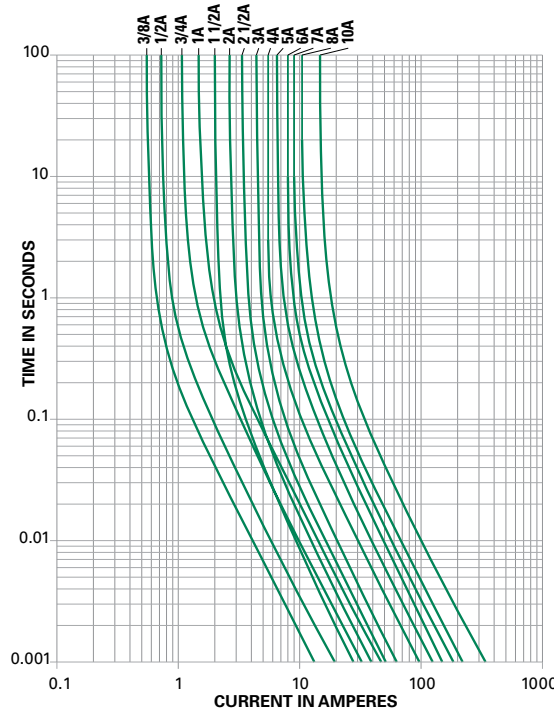
Temperature Re-rating Curve

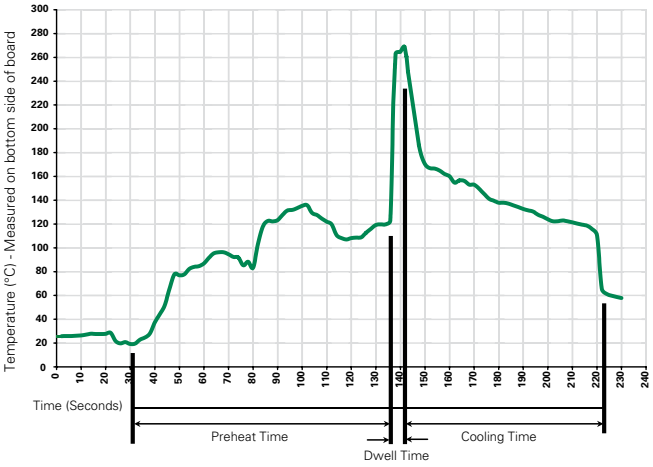


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

2AG > Fast-Acting > 208 Series

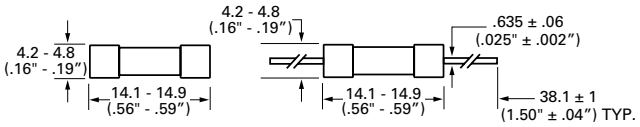
Product Characteristics

Materials	Body : Glass Cap : Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 method 208
Product Marking	Cap1 : Brand logo, current and voltage ratings Cap2 : Series and agency approval marks

Operating Temperature:	–55°C to 125°C.
Thermal Shock:	MIL-STD-202, Method 107, Test Condition B (5 Cycles -65°C to +125°C).
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

208 000P Series 208 000EP Series



Part Numbering System

0208 xxxx M X E P

Series

Current Rating Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Loose Pack

Option Codes
Blank = Cartridge Type Fuse
E = Axial Leaded Fuse

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
208 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1500	DRT1	T1=53mm (2.087")

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	150	In-Line Fuseholder	350	10
	286	Panel Mount Flip-Top Shock-Safe Fuseholder	250	10
Block	254	OMNI-BLOK® Fuse Block	400	10
Clip	111	PC Board Mount Fuse Clip	250	10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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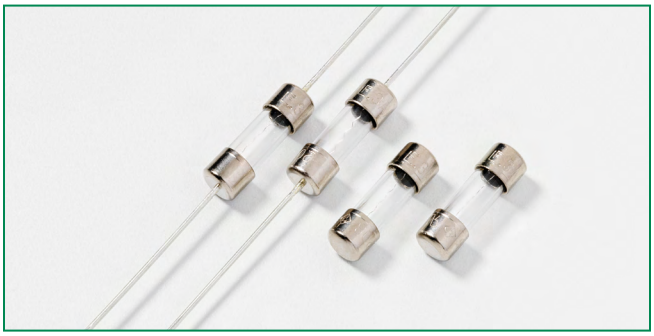
209 Series Lead-Free 2AG, Slo-Blo® Fuse



Description

Littelfuse 209 Series (2AG) 350V, Slo-Blo® Fuses are available in cartridge form or with axial leads. This series provides the same performance characteristics as its 3AG counterpart, while occupying one-third the space. Sleeved fuses are available.

Features

- In accordance with Underwriter's Laboratories Standard UL 248-14
- Available in cartridge and axial lead form and with various forming dimensions
- RoHS compliant and Lead-free

Applications

- Electronic Lighting Ballasts

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E10480	0.250A - 7A
PS E	NBK200405-E10480C/D NBK110512-E10480A/B NBK210405-E10480E/F	1A - 3.5A 4A - 5A 6A - 7A
CE		0.250A - 7A

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 Hours, **Min.**
135%	1 Hour, **Max.**
200%	3 Sec. **Min.** ; 20 Sec. **Max.**

Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals		
						c UL us	PS E	CE
.250	0.25	350	100A @ 350Vac	2.410	0.216	x		x
.375	0.375	350		1.170	0.87	x		x
.500	0.5	350		0.688	1.60	x		x
.600	0.6	350		0.477	1.750	x		x
.750	0.75	350		0.340	2.950	x		x
.800	0.8	350		0.304	3.450	x		x
001.	1	350		0.210	5.640	x	x	x
1.25	1.25	350		0.1460	16.2	x	x	x
01.5	1.5	350		0.1077	20.8	x	x	x
002	2	350		0.0689	30.0	x	x	x
2.25	2.25	350		0.0567	39.0	x	x	x
02.5	2.5	350		0.0502	70.0	x	x	x
003	3	350		0.0383	77.0	x	x	x
03.5	3.5	350		0.0312	110	x	x	x
004	4	350		0.0258	148	x	x	x
005	5	350		0.0186	267	x	x	x
006	6	350		0.0141	380	x	x	x
007	7	350		0.0116	464	x	x	x

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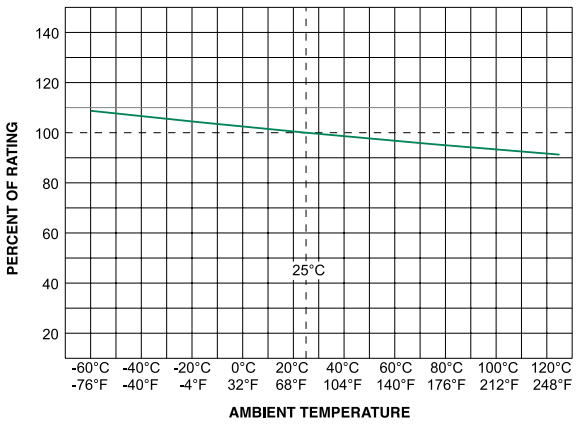
Axial Lead & Cartridge Fuses

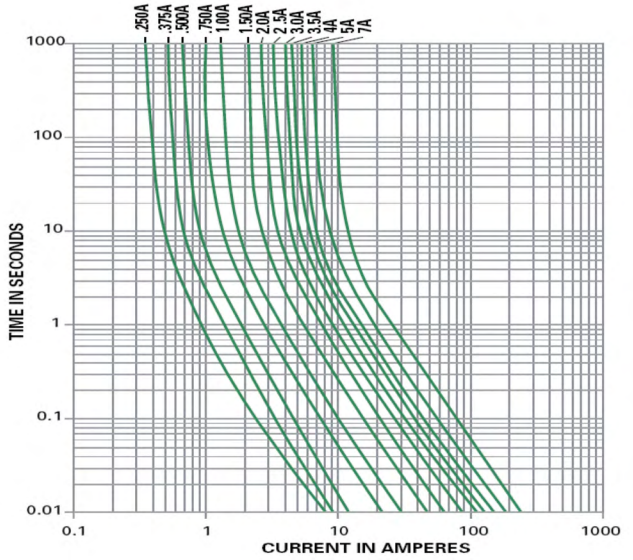
2AG > Slo-Blo® Fuse > 209 Series

Temperature Re-rating Curve

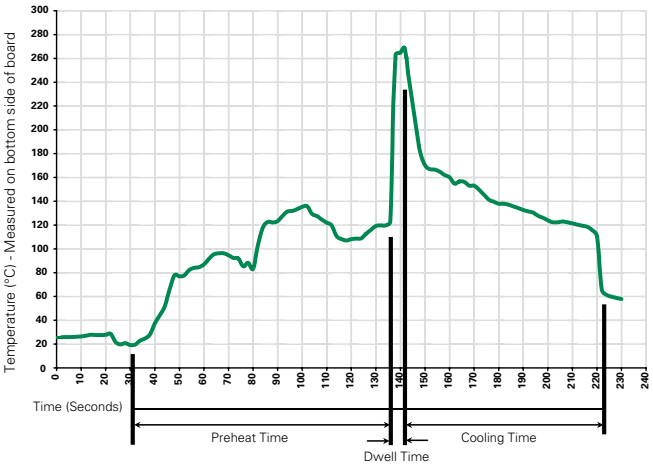


Note
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

2AG > Slo-Blo® Fuse > 209 Series

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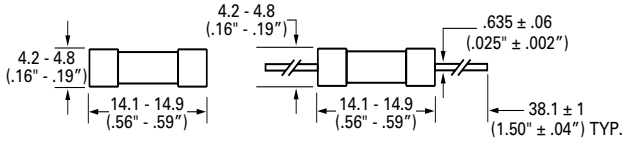
Product Characteristics

Materials	Body : Glass Cap : Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 method 208
Product Marking	Cap1 : Brand logo, current and voltage ratings Cap2 : Series and agency approval marks

Operating Temperature:	–55°C to 125°C.
Thermal Shock:	MIL-STD-202, Method 107, Test Condition B (5 Cycles -65°C to +125°C).
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

209 000P Series 209 000EP Series



Part Numbering System

0209 xxxx M X E P

Series

Current Rating Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Loose Pack

Option Codes
Blank = Cartridge Type Fuse
E = Axial Leaded Fuse

Lead-free

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
209 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1500	DRT1	T1=53mm (2.087")

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	150	In-Line Fuseholder	350	10
	286	Panel Mount Flip-Top Shock-Safe Fuseholder	250	10
Block	254	OMNI-BLOK® Fuse Block	400	10
Clip	111	PC Board Mount Fuse Clip	250	10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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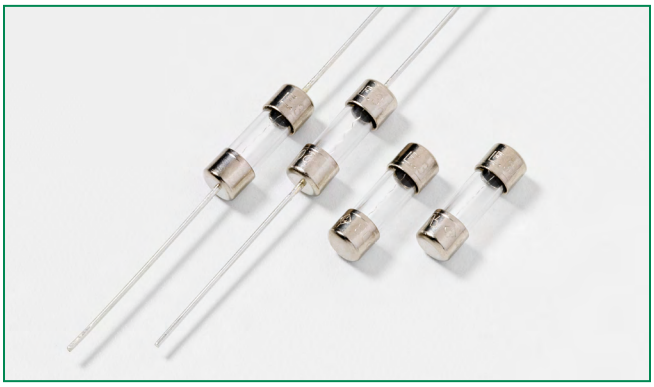
220 Series, Lead-Free 2AG Special Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	0003,0004,0010,0011, 0025,0029,0030,0031, 0036
VDE	E10480	0007,0012,0013,0019, 0044,0045,0059,0060, 0061
PSE	NBK200405-E10480A/B/C/D NBK110512-E10480A/B NBK210405-E10480E/F	1A - 3.5A 4A - 5A 6A - 7A
CSA	29862	0003,0004,0007,0010, 0011,0013,0019,0029, 0044
CE		0003-0061

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Description

The 2AG Special Fuses with various voltage ratings, provide special electric performance as required.

Features

- In accordance with Underwriters Laboratories Standard UL 248-14
- Available in cartridge and axial lead format with various forming dimensions
- RoHS compliant and Lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Amp code	Opening Time
100%	0007,0012,0013,0019, 0031,0036,0037,0044, 0054,0060,0061	4 hours, Minimum
135%		1 hour, Maximum
200%		1 sec., Maximum

% of Ampere Rating	Amp code	Opening Time
100%	0025,0030,0038,0040, 0045,0059	4 hours, Minimum
135%		1 hour, Maximum
200%		3 secs., Minimum
		20 secs., Maximum

% of Ampere Rating/ Overload Current	Amp code	Opening Time
100%	0010	4 hours, Minimum
150%		15 mins, Maximum
0.9A		90 secs., Maximum

Overload Current	Amp code	Opening Time
0.6A	0003,0004,0011	90 secs., Maximum

Overload Current	Amp code	Opening Time
0.6A	0029	90 secs., Maximum
2A		2 secs., Maximum
6A		0.5 sec., Maximum

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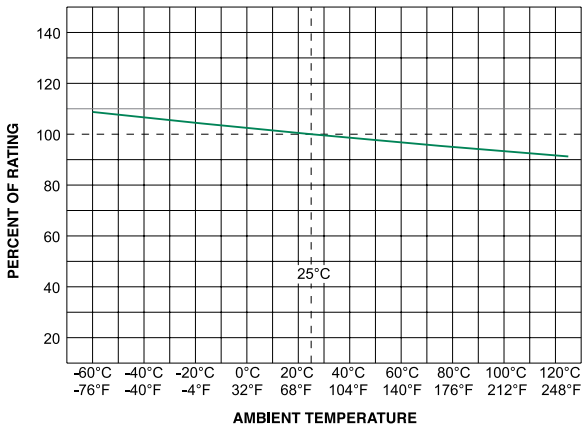
Revised: 03/03/17

Electrical Characteristics

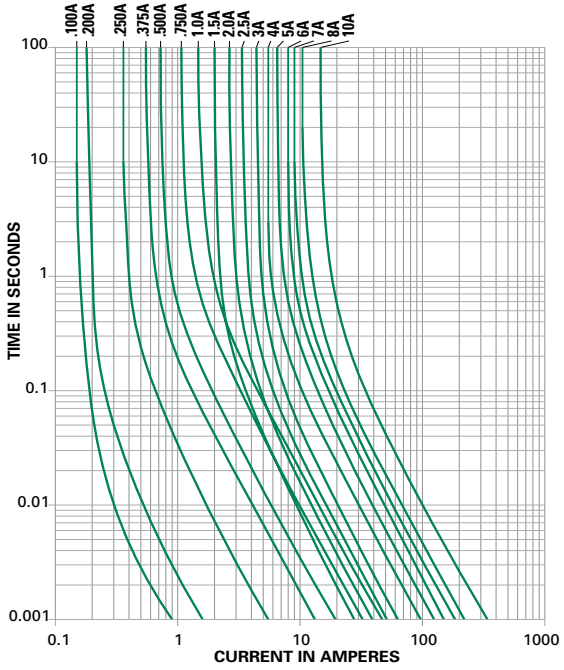
Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals				
						UL			CSA	CE
0.35	0003	250	35A@250Vac, 10KA@125Vac	1.3100	0.490	X			X	X
0.35	0004	250		1.3100	0.490	X			X	X
3	0007	350	100A@350Vac, 60A@530Vac	0.0317	4.62		X	X	X	X
0.55	0010	250	35A@250Vac, 10KA@125Vac, 10KA@125Vdc	0.4945	2.04	X			X	X
0.35	0011	250	35A@250Vac, 10KA@125Vac	1.3100	0.49	X			X	X
2	0012	350	100A@350Vac	0.0497	1.50		X	X		X
5	0013	300		0.0186	17.0		X	X	X	X
3	0019	350	100A@350Vac, 100A@125Vdc	0.0317	4.62		X	X	X	X
1.25	0025	250	100A@250Vac, 10KA@125Vac, 10KA@125 Vdc	0.1460	15.4	X		X		X
0.35	0029	250	35A@250Vac, 10KA@125Vac	1.3100	0.490	X			X	X
0.375	0030	250	35A@250Vac, 10KA@125Vac, 10KA@125Vdc	1.1685	0.82	X				X
0.3	0031	250		0.5900	0.0300	X				X
0.5	0036	300	35A@300Vac, 10KA@125Vac	0.2650	0.365	X				X
0.75	0037	300		0.1520	1.05					X
5	0038	250	50A@250Vac	0.0186	267					X
0.5	0040	250	35A@250Vac, 10KA@125Vac, 10KA@125Vdc	0.6935	1.58					X
1	0044	350	100A@350Vac	0.1027	2.22		X	X	X	X
2	0045	350	100A@250Vac, 100A@350Vac, 10KA@125Vac, 10KA@125Vdc	0.0698	30.0		X	X		X
7	0059	350	100A@350Vac / 160A@140Vdc	0.0116	464		X	X		X
0.5	0060	350	35A@350Vac	0.2650	0.365		X			X
0.75	0061	350		0.1520	1.05		X			X

Temperature Re-rating Curve



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

Average Time Current Curves



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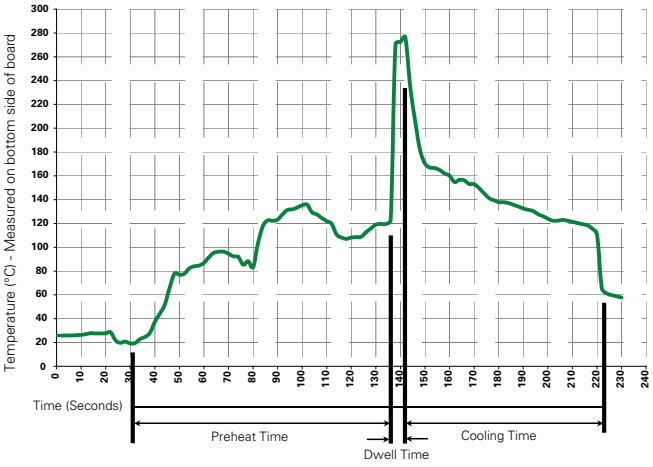
Axial Lead & Cartridge Fuses

2AG > Special Fuse > 220 Series

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Max.
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

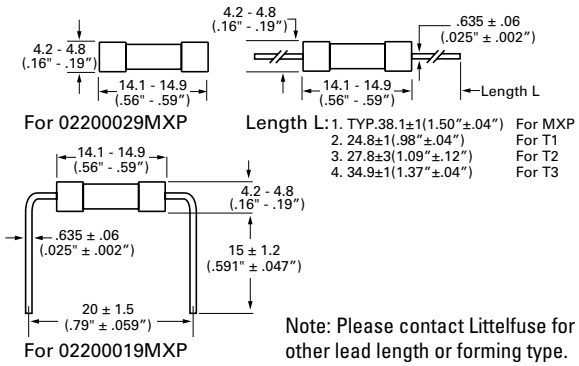
Product Characteristics

Material	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

Operating Temperature	-55 °C to +125 °C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles - 65°C to 125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and Elevated Temp (40 °C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

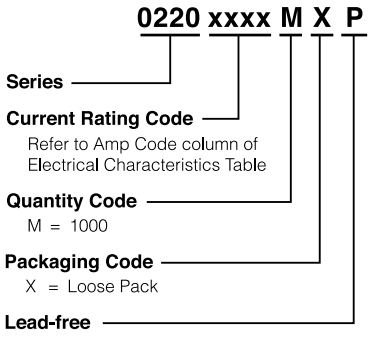
Dimensions

220 000P Series



Note: Please contact Littelfuse for other lead length or forming type.

Part Numbering System



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXSL	N/A
Reel and Tape	EIA 296-E	1000	MRT1	53mm (2.087")
Reel and Tape	EIA 296-E	1500	DAT1	53mm (2.087")
Reel and Tape	EIA 296-E	1500	DRT1	53mm (2.087")
Reel and Tape	EIA 296-E	1500	DRT2	63mm (2.500")
Reel and Tape	EIA 296-E	1500	DRT3	73mm (2.874")
Reel and Tape	EIA 296-E	2500	ERT1	53mm (2.087")

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Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	245	Panel Mount Shock-Safe Fuseholder	300	10
	150	In-Line Fuseholder	350	10
	286	Panel Mount Flip-Top Shock-Safe Fuseholder	250	10
Block	254	OMNI-BLOK® Fuse Block	400	10
Clip	111	PC Board Mount Fuse Clip	250	10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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2205 Series, Lead-Free 2AG, Slo-Blo® Fuse

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E10480	0.250A - 2.5A
CSA	29862	0.250A - 2.5A
CE	N/A	0.250A - 2.5A

Additional Information

Datasheet | Resources | Samples | Accessories

Description

The 2AG Slo-Blo® Axial Leaded Fuses provide the same performance characteristics as their 3AG counterpart while occupying one-third the space.

Features

- In accordance with Underwriter's Laboratories Standard UL 248-14
- Fuses are boardwashable in most solvents with thermoplastic sleeve
- Available in axial lead form and with various lead forming dimensions
- RoHS compliant and lead–free

Applications

Used as supplimentary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
135%	1 hour, Maximum
200%	3 secs Min.; 20 secs Max.

Electrical Characteristic Specifications by Item

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Nom Voltage Drop (mV)	Nom Power Dissipation (W)	Agency Approvals	
								c UL us	CSA
0.25	.250	250	35A @ 250VAC 10KA @ 125VAC 60A @ 600VAC	2.4300	0.334	N/A	N/A	x	x
0.35	.350	250		1.3100	0.490	N/A	N/A	x	x
0.375	.375	250		1.1685	0.83	N/A	N/A	x	x
0.5	.500	250		0.6935	1.63	N/A	N/A	x	x
0.75	.750	250		0.3430	3.91	N/A	N/A	x	x
1	001	250		0.2120	5.64	N/A	N/A	x	x
1.25	1.25	250		0.1460	17.0	N/A	N/A	x	x
1.5	01.5	250		0.1077	20.8	N/A	N/A	x	x
2	002	250	35A @ 250VAC 10KA @ 125VAC	0.0698	40.0	N/A	N/A	x	x
2.5	02.5	250		0.0502	65.0	N/A	N/A	x	x

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Application testing is strongly recommended. Specifications are subject to change without notice.
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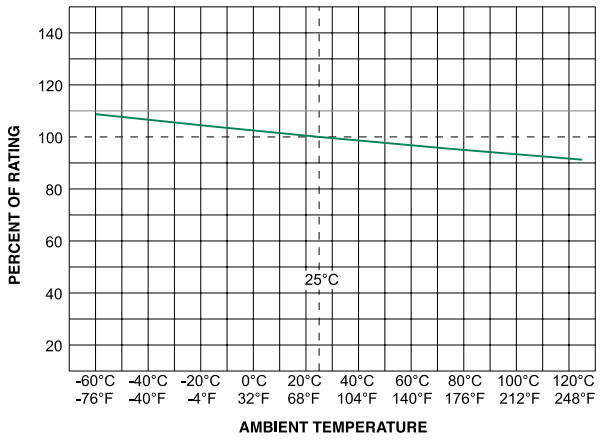
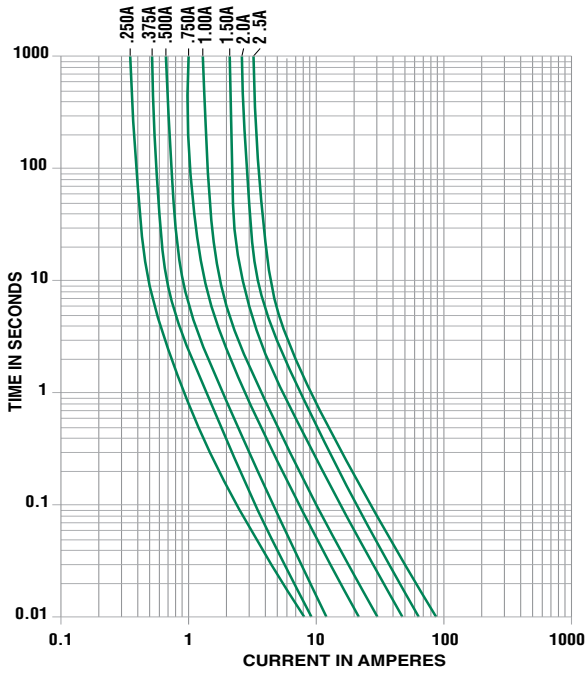
Temperature Re-rating Curve

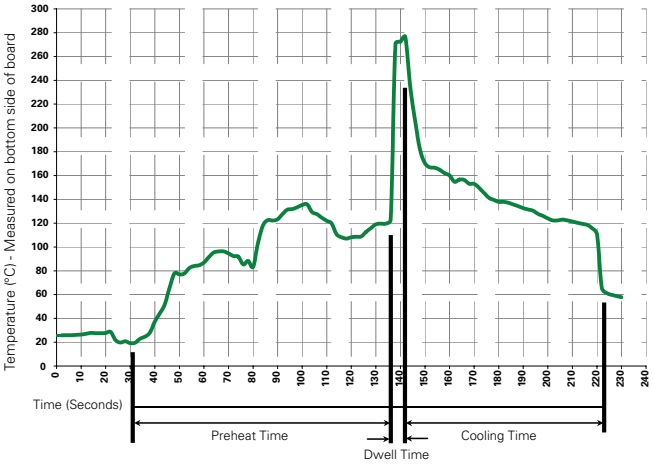


Note: Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Max
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

2AG > Slo-Blo® Fuse > 2205 Series

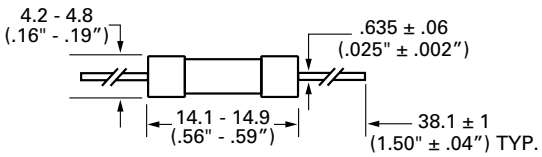
Product Characteristics

Materials	Body: Glass Cap : Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1 : Brand logo, current and voltage ratings Cap2 : Series and agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 Cycles -65°C to +125°C).
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and Elevated Temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

2205 000P Series



Part Numbering System

02205 xxxx M X P

Series

Current Rating Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Loose Pack

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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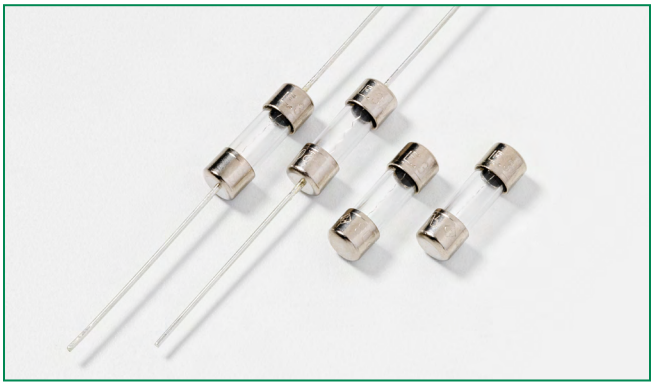
224/225 Series Lead-Free 2AG, Fast-Acting



Description

The 2AG Fast-Acting Fuses are available in cartridge form or with axial leads. 2AG Fuses provide the same performance characteristics as their 3AG counterpart, while occupying one-third the space. Sleeved fuses are available.

Features

- In accordance with Underwriter's Laboratories Standard UL 248-14
- Available in cartridge and axial lead form and with various forming dimensions
- RoHS compliant and Lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	0.375A - 3.5A
TÜV	E10480	4A - 10A
CSA	29862	0.375A - 10A
PSE	NBK200405-E10480A/B/C/D NBK110512-E10480A/B NBK210405-E10480E/F	1A - 3.5A 4A - 5A 6A - 10A
CE	N/A	0.375A - 10A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
135%	1 hour, Maximum
200%	1 sec., Maximum

Additional Information

Datasheet 224 Series | **Resources 224 Series** | **Samples 224 Series** | **Datasheet 225 Series** | **Resources 225 Series** | **Samples 225 Series** | **Accessories 224 & 225 Series**

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals				
						UL	TÜV	CSA	PSE	CE
.375	0.375	250	35A@250Vac 10KA@125Vac 10KA@125Vdc	0.3950	0.171	x		x		x
.500	0.5	250		0.2650	0.365	x		x		x
.750	0.75	250		0.1520	1.050	x		x		x
001.	1	250		0.1027	2.220	x		x	x	x
01.5	1.5	250	100A@250Vac 10KA@125Vac 10KA@125Vdc	0.0712	0.800	x		x	x	x
002.	2	250		0.0497	2.180	x		x	x	x
02.5	2.5	250		0.0372	3.820	x		x	x	x
003.	3	250		0.0317	4.620	x		x	x	x
03.5	3.5	250		0.0265	6.700	x		x	x	x
004.	4	125	100A@250Vac 500A@125Vac	0.0240	9.400		x	x	x	x
005.	5	125		0.0186	17.0		x	x	x	x
005.	5	250		0.0186	17.0		x	x		x
006.	6	125	500A@125Vac	0.0154	22.1		x	x	x	x
007.	7	125		0.0130	40.0		x	x	x	x
008.	8	125		0.0107	56.0		x	x	x	x
010.	10	125		0.0075	116.0		x	x	x	x

* 10A with 500A @ 125 Vdc internal breaking capacity testing.

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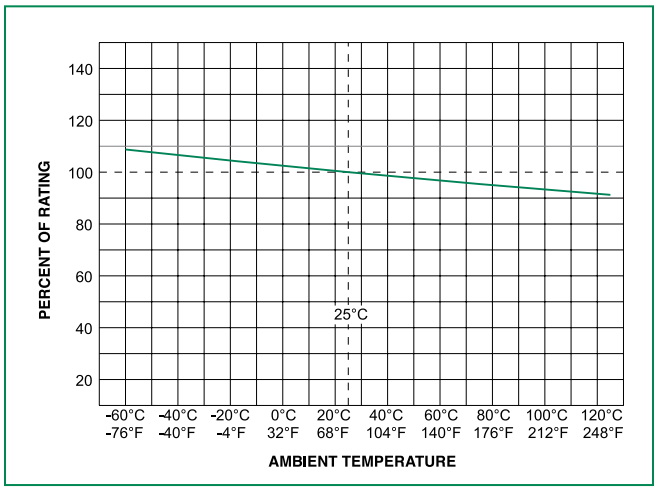
Axial Lead & Cartridge Fuses

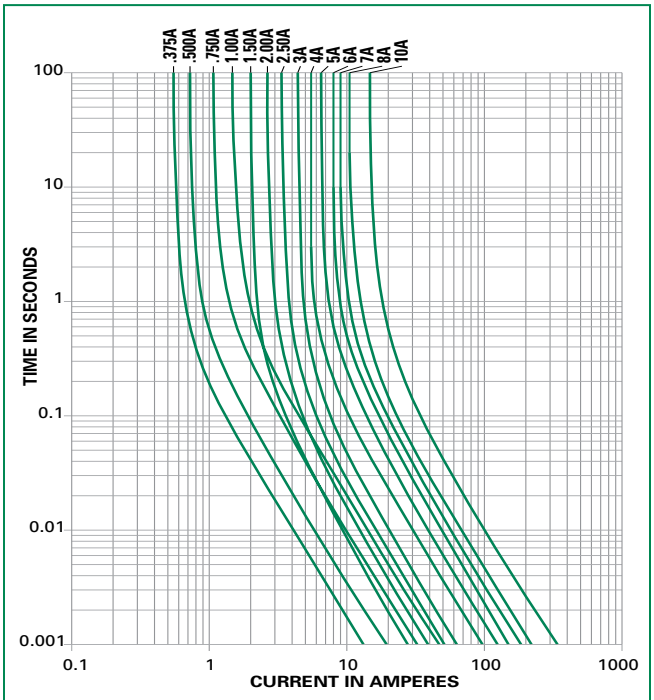
2AG > Fast Acting > 224/225 Series

Temperature Re-rating Curve

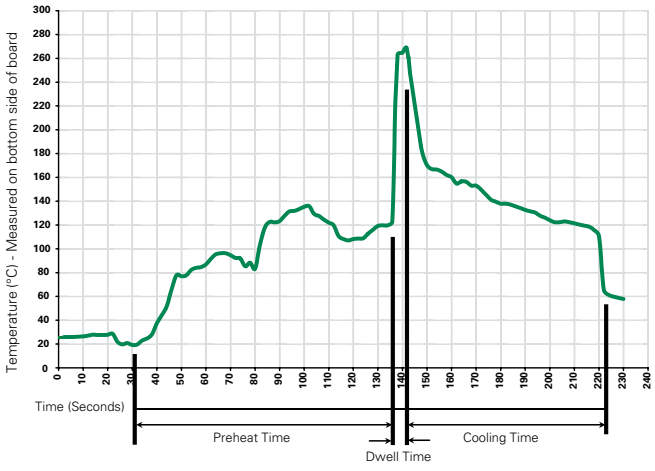


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

2AG > Fast Acting > 224/225 Series

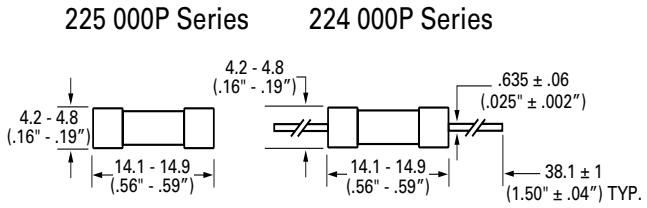
Littelfuse
Expertise Applied | Answers Delivered

Product Characteristics

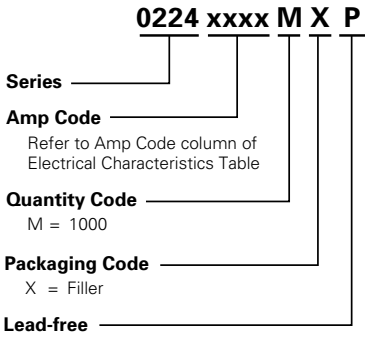
Materials	Body : Glass Cap : Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1 : Brand logo, current and voltage ratings Cap2 : Series and agency approval marks

Operating Temperature:	–55°C to 125°C.
Thermal Shock:	MIL-STD-202, Method 107, Test Condition B (5 Cycles -65°C to +125°C).
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions



Part Numbering System



Note: The ratings from 4A to 10A with MXUP in the suffix

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
224 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A
Reel and Tape	EIA 296-E	1500	DRT1	T1=53mm (2.087")
225 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	245	Panel Mount Shock-Safe Fuseholder	300	10
	150	In-Line Fuseholder	350	10
	286	Panel Mount Flip-Top Shock-Safe Fuseholder	250	10
Block	254	OMNI-BLOK® Fuse Block	400	10
Clip	111	PC Board Mount Fuse Clip	250	10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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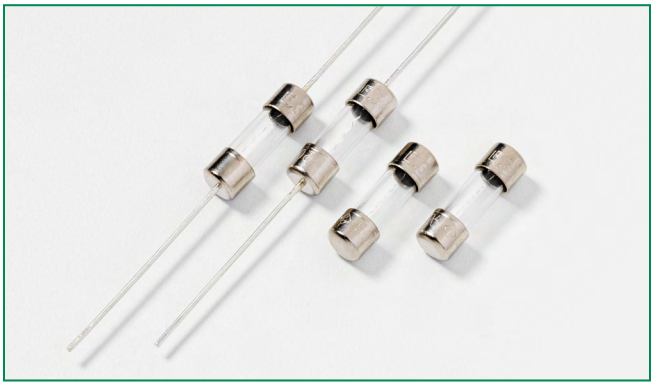
229/230 Series 2AG, Slo-Blo® Fuse with Indicating Option



Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	0.250A - 3.5A
CSA	29862	0.250A - 7A
VDE	E10480	4A - 7A
PSE	NBK200405 - E10480C/D NBK110512 - E10480A/B NBK210405 - E10480E/F	1A - 3.5A 4A - 5A 6A - 7A
CE	N/A	0.250A - 7A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
135%	1 hour, Maximum
200%	3 seconds, Minimum
	20 seconds, Maximum

Description

Littelfuse 229/230 series Slo-Blo® Fuses are available in 2AG size cartridge or axial lead form, offer tripped fuse indicating option, and offer features designed to meet rigorous Telecom industry requirements.

229/230 series product ordered with the tripped fuse indicating option show discoloration of the glass body immediately after trip. They offer the same performance characteristics as standard product, and help to reduce time locating the tripped fuse and troubleshooting circuit issues.

The 229/230 series 0.25A - 1.25A range combines conventional overcurrent protection with ability to withstand high current, short duration pulses which complies to short circuit requirements of UL 60950 for telephone equipment. Insulating sleeve option is also available. Please refer to the Surge Withstand Specifications section of this document for additional information.

Features

- Available in cartridge and axial lead form, and a wide range of lead forming dimension and packaging options
- In accordance with UL Standard 248-14
- RoHS compliant and Lead-free
- Tripped fuse indicating option (add suffix 'S' to part number)
- Fuses are available for board washable with the additional sealing process (add suffix 'A' to part number)
- Sleeved fuse option available (contact Littelfuse for additional information)

Additional Information

Datasheet 229 Series | **Resources 229 Series** | **Samples 229 Series** | **Accessories 229 & 230 Series**

Datasheet 230 Series | **Resources 230 Series** | **Samples 230 Series**

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

Electrical Characteristic Specification by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals				
						UL			CSA	CE
.250	0.25	250	35A@250Vac 10KA@125Vac 10KA@125Vdc 80A@310Vac	2.4300	0.339	x			x	x
.350	0.35	250		1.3100	0.640	x			x	x
.375	0.375	250		1.1685	0.820	x			x	x
.500	0.5	250		0.6935	1.64	x			x	x
.600	0.6	250		0.4805	1.75	x			x	x
.750	0.75	250		0.3430	2.95	x			x	x
.800	0.8	250		0.3060	3.45	x			x	x
001.	1	250		0.2120	5.64	x		x	x	x
1.25	1.25	250	100A@250Vac 10KA@125Vac 10KA@125Vdc 80A@310Vac	0.1460	16.8	x		x	x	x
01.5	1.5	250		0.1077	20.0	x		x	x	x
002.	2	250		0.0698	30.0	x		x	x	x
2.25	2.25	250		0.0567	39.0	x		x	x	x
02.5	2.5	250		0.0502	50.0	x		x	x	x
003.	3	250		0.0383	77.0	x		x	x	x
03.5	3.5	250	100A@250Vac 10KA@125Vac 10KA@125Vdc	0.0312	110.0	x		x	x	x
004.	4	125	400A@125Vac 400A@125Vdc	0.0258	148.0		x	x	x	x
005.	5	125		0.0186	267		x	x	x	x
006.	6	125		0.0141	380		x	x	x	x
007.	7	125		0.0116	464		x	x	x	x

Surge Withstand Specificatons

Peak Withstand Current(Ip): These fuses will withstand 50 repetitions of a double exponential impulse wave having peak currents(Ip) and peak voltages as listed.

Amp Code	Ampere Rating (A)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	10×160 µs 1500V	10×560 µs 800V	10×1000 µs 1000V
.250	0.25	60A@600Vac 40A@600Vac 7A@600Vac 2.2A@600Vac	2.4300	0.339	23.0A	16.6A	12.4A
.350	0.35		1.3100	0.640	34.0A	25.8A	19.3A
.375	0.375		1.1685	0.820	40.0A	25.4A	19.0A
.500	0.5		0.6935	1.64	60.0A	37.7A	28.2A
.600	0.6		0.4805	1.75	71.0A	47.2A	35.3A
.750	0.75		0.3430	2.95	91.0A	65.5A	49.0A
.800	0.8		0.3060	3.45	104.0A	68.9A	51.6A
001.	1		0.2120	5.64	130A	88.6A	66.3A
1.25	1.25*		0.1460	16.8	162.0A	118.1A	100.0A

* 500A peak, 2500V, 2×10 microseconds, 20 repetitions

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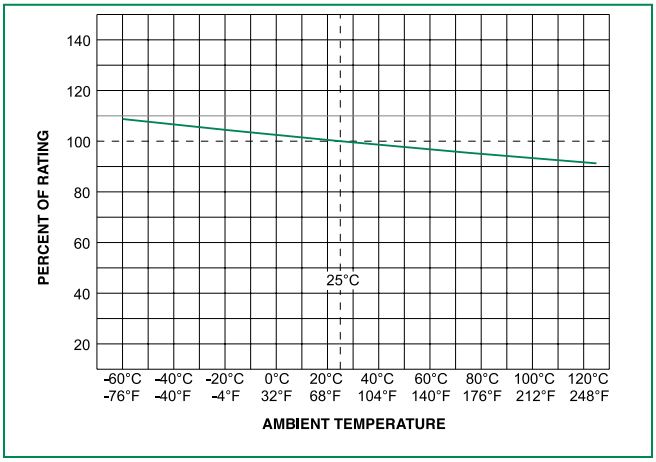
Axial Lead & Cartridge Fuses

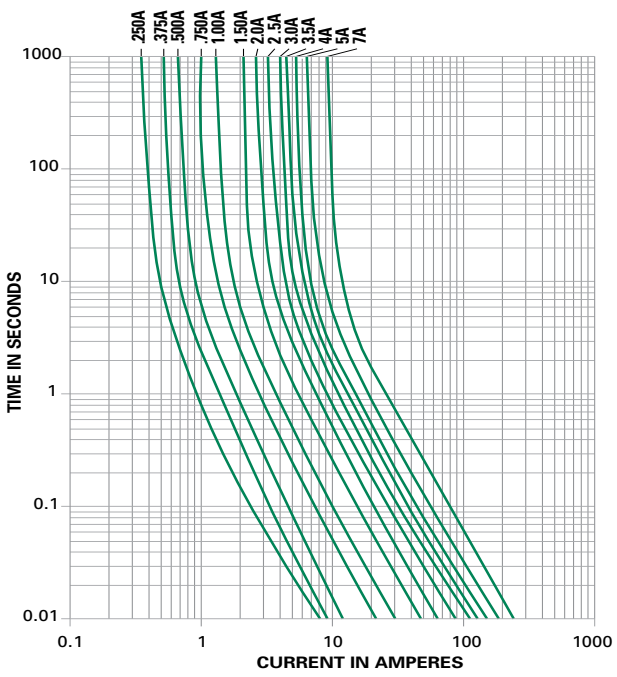
2AG > Time Lag > 229/230 Series

Temperature Re-rating Curve

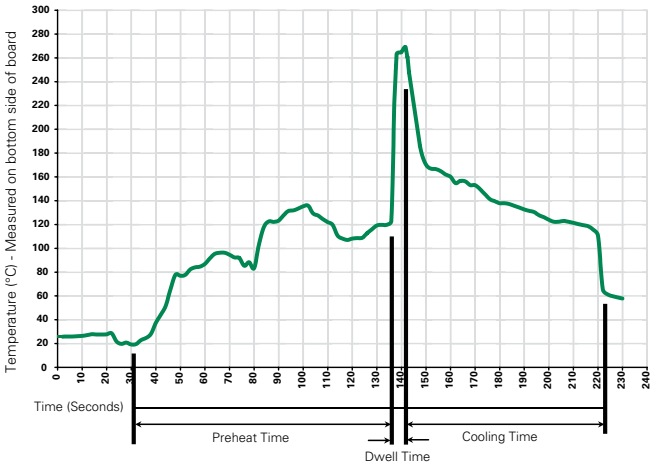


Note:
Rerating depicted in this curve is in addition to the industry practice derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260° C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

2AG > Time Lag > 229/230 Series

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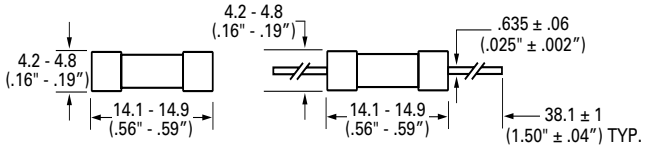
Product Characteristics

Materials	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles - -65°C to 125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and Elevated temperature (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

229 000P Series 230 000P Series



Axial Lead Material: Solder coated Copper.

Part Numbering System

0229 xxxx M X P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Lead-free

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	245	Panel Mount Shock-Safe Fuseholder	300	10
	150	In-Line Fuseholder	350	10
	286	Panel Mount Flip-Top Shock-Safe Fuseholder	250	10
Block	254	OMNI-BLOK® Fuse Block	400	10
Clip	111	PC Board Mount Fuse Clip	250	10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
229 Series				
Bulk	N/A	5	VX	N/A
Bulk	N/A	5	VXS	N/A
Bulk	N/A	100	HX	N/A

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Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
229 Series (cont.)				
Bulk	N/A	100	HXS	N/A
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXS	N/A
230 Series				
Bulk	N/A	5	VX	N/A
Bulk	N/A	5	VXS	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	100	HXS	N/A
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Bulk	N/A	1000	MXF1	N/A
Bulk	N/A	1000	MXF16	N/A
Bulk	N/A	1000	MXF16O	N/A
Bulk	N/A	1000	MXF17	N/A
Bulk	N/A	1000	MXF17O	N/A
Bulk	N/A	1000	MXF23	N/A
Bulk	N/A	1000	MXF23O	N/A
Bulk	N/A	1000	MXF32	N/A
Bulk	N/A	1000	MXO	N/A
Bulk	N/A	1000	MXS	N/A
Reel and Tape	EIA 296-E	1500	DRT2	T2=63mm (2.500")
Reel and Tape	EIA 296-E	1500	DRT2S	T2=63mm (2.500")
Reel and Tape	EIA 296-E	1500	DRT4	N/A
Reel and Tape	EIA 296-E	2500	ERT2	T2=63mm (2.500")
Reel and Tape	EIA 296-E	2500	ERT2S	T2=63mm (2.500")
Reel and Tape	EIA 296-E	1000	MRT1E	T1=53mm (2.087")
Reel and Tape	EIA 296-E	1500	DAT1	T1=53mm (2.087")
Reel and Tape	EIA 296-E	1500	DAT1O	T1=53mm (2.087")
Reel and Tape	EIA 296-E	1500	DRT1	T1=53mm (2.087")
Reel and Tape	EIA 296-E	1500	DRT1S	T1=53mm (2.087")
Reel and Tape	EIA 296-E	1500	DRT1SS	T1=53mm (2.087")
Reel and Tape	EIA 296-E	1500	DRT3	T3=73mm (2.874")
Reel and Tape	EIA 296-E	1500	DRT3S	T3=73mm (2.874")
Reel and Tape	EIA 296-E	2500	ERT1	T1=53mm (2.087")
Reel and Tape	EIA 296-E	2500	ERT1S	T1=53mm (2.087")
Reel and Tape	EIA 296-E	2500	ERT3	T3=73mm (2.874")
Reel and Tape	EIA 296-E	2500	ERT3S	T3=73mm (2.874")

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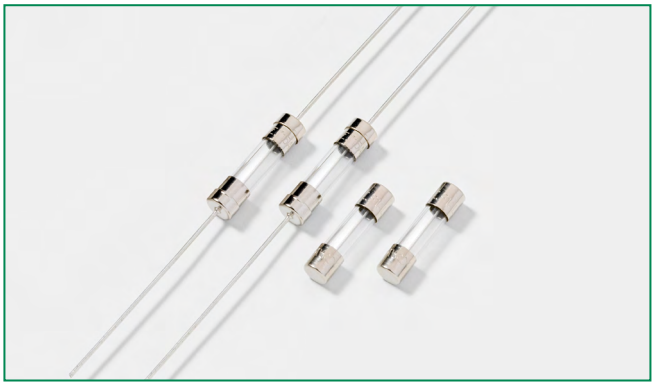
201P Series, 5×20mm, Medium–Acting Fuse



Description

5×20mm Medium–Acting, Time-lag, Glass Body Cartridge Fuse.

Features

- Visual fault indication
- Direct solderable or plug-in versions
- Worldwide availability
- RoHS compliant and Lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E67006	0.050A-1.25A

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
150	1 Hour Minimum
210	600 s Maximum
400	40 ms Minimum 2 s Maximum
1000	5 ms Minimum 90 ms Maximum

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating	Voltage Rating	Interrupting Rating	Nominal Resistance Cold Ohms (mohms)	Nominal Melting Integral 10 x I_N (A^2s)	Voltage Drop 1.0 x I_N max. (mV)	Power Dissipation 1.5 x I_N max. (W)	Agency Approvals c UL us
0050	0.050	250V	80A @ 250VAC	9200	0.00900	640	0.10000	x
0063	0.063	250V		7400	0.01100	600	0.10000	x
0080	0.080	250V		5330	0.01700	540	0.20000	x
0100	0.100	250V		3550	0.03100	500	0.20000	x
0125	0.125	250V		2650	0.05700	440	0.20000	x
0160	0.160	250V		1780	0.08500	400	0.20000	x
0200	0.200	250V		1250	0.12000	340	0.30000	x
0250	0.250	250V		870	0.13000	320	0.30000	x
0315	0.315	250V		590	0.16000	300	0.30000	x
0400	0.400	250V		435	0.28000	230	0.40000	x
0500	0.500	250V		160	0.35000	210	0.40000	x
0630	0.630	250V		130	0.80900	190	0.50000	x
0800	0.800	250V		85	1.10000	170	0.60000	x
1100	1.000	250V		70	2.00000	160	0.70000	x
1125	1.250	250V		50	5.12000	160	0.80000	x

Note: 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

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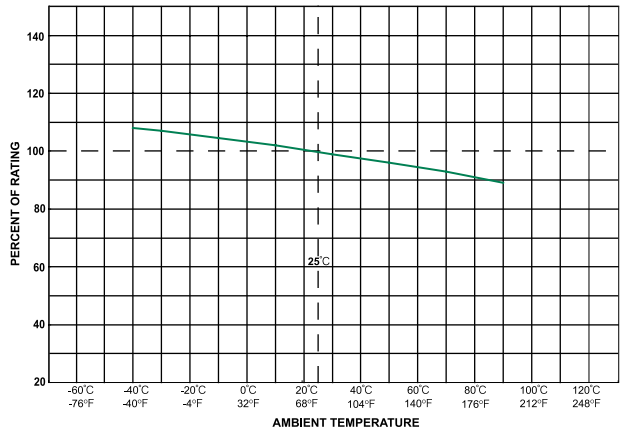
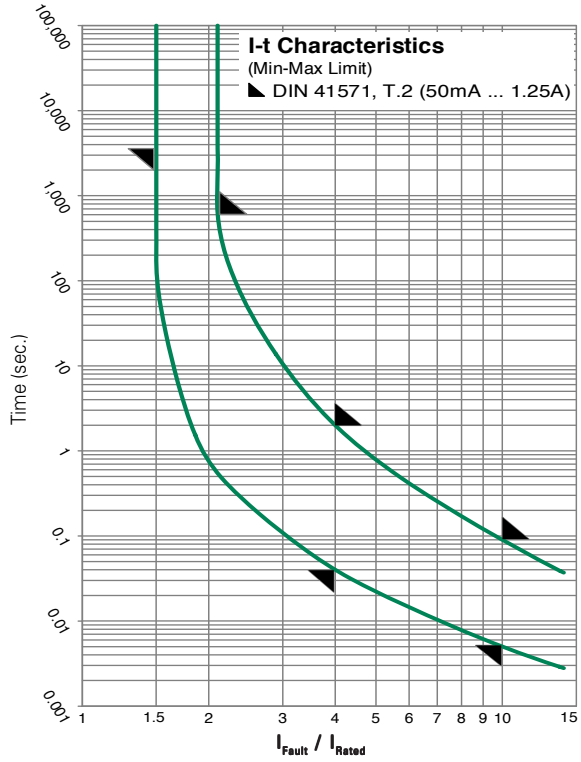
Cartridge and Axial Lead Fuses

5×20mm > Medium Acting > 201P Series

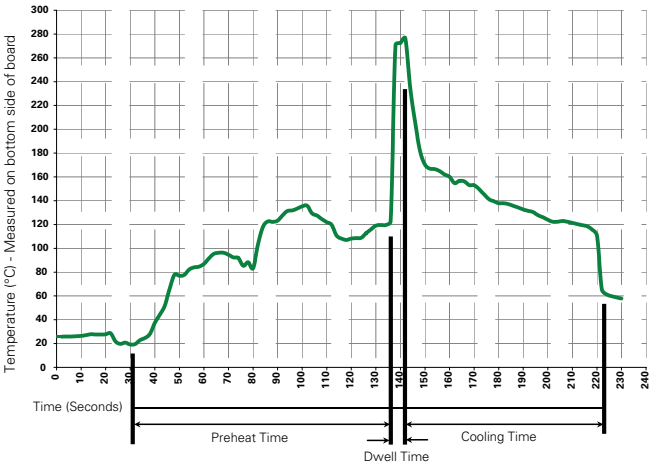
Temperature Re-rating Curve



Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Cartridge and Axial Lead Fuses

5×20mm > Medium Acting > 201P Series

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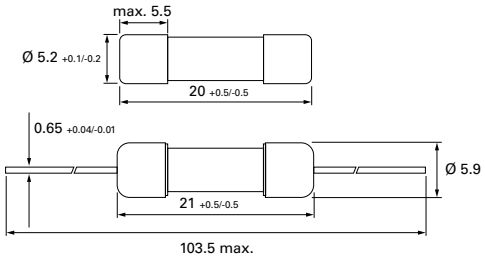
Product Characteristics

Materials	Body: Glass End Caps: Nickel–plated brass Optional Holders: Nickel-plated caps Tin-plated wires
Product Marking	Cap1: Brand mark, current and voltage ratings Cap2: Series and agency approval marks
Solderability	MIL-STD-202, Method 208
Soldering Heat Resistance	260°C, 10 sec. (IEC 60068-2-20)

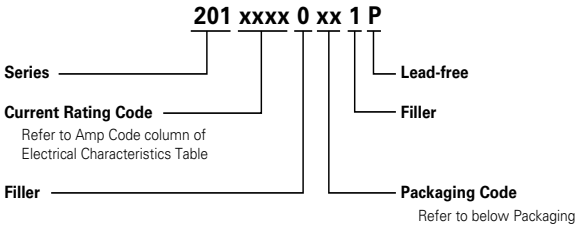
Operating Temperature	-25°C to +70°C
Climatic Category	-25°C/+70°C/21 days (IEC 60068-1-3)
Stock Conditions	-10°C to +60°C RH, ≤ 75% yearly average, without dew, maximum value for 30 days-95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60 Hz at 0.75 mm amplitude 60 - 2000 Hz at 10 g acceleration

Dimensions



Optional Holders

Part Numbering System



Packaging

Packaging Code	Packing Option	Quantity
00	Bulk	1000
02	Bulk	100
30	Bulk with Four Color Code	1000
43	Tape and Reel	1250
53	Tape and Reel with Four Color Code	1250

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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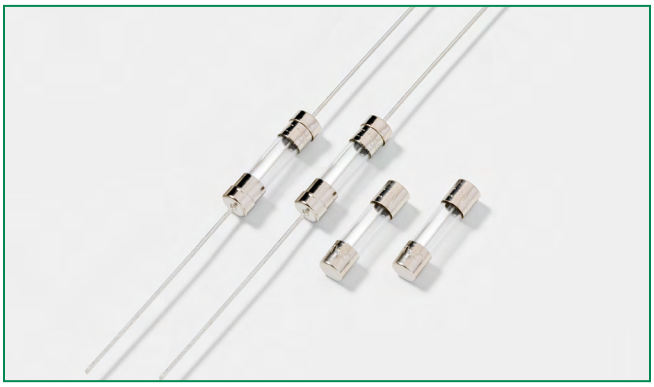
217 Series, 5 × 20 mm, Fast-acting Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
PS E	Cartridge: NBK090205-E10480A NBK120802-E10480C Leaded: NBK090205-E10480B NBK120802-E10480D	 1A – 5A 6.3A – 15A 1A – 5A 6.3A – 15A
CCC	2002010207007600	0.032A – 6.3A
KC	SU05001-3004 SU05001-2005 SU05001-2006 SU05001-2007	0.032A – 40mA 50mA – 0.0315A 0.0400A – 6.3A 8A & 10A
UL	E10480	0.032A – 10A
CSA	29862	0.032A – 6.3A
S	1517221	0.032A – 6.3A
VDE	40014645	0.032A – 6.3A, 8A*, 10A*
VDE	40016647	15A*
KM	KM41462	0.0400A – 6.3A
CE	N/A	0.032A – 15A

*Approval for cartridge versions only

Description

5×20mm fast-acting glass body cartridge fuse designed to IEC specification.

Features

- Designed to International (IEC) Standards for use globally
- Meets the IEC 60127-2, Sheet 2 specification for fast-acting fuses
- Available in cartridge and axial lead form
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	0.032A–0.0100A	60 minutes, Minimum
	0.0125A-6.3A	60 minutes, Minimum
	8A-15A	30 minutes, Minimum
210%	0.032A-0.0100A	30 minutes, Maximum
	0.0125A-6.3A	30 minutes, Maximum
	8A-15A	30 minutes, Maximum
275%	0.032A-0.0100A	0.01 sec., Min.; .5 sec. Max.
	0.0125A-6.3A	0.05 sec., Min.; 2 sec. Max.
	8A-15A	0.05 sec., Min.; 2 sec. Max.
400%	0.032A-0.0100A	.003 sec., Min.; 0.1 sec.. Max.
	0.0125A-6.3A	.01 sec., Min.; 0.3 sec. Max.
	8A-15A	.01 sec., Min.; 0.4 sec. Max.
1000%	0.032A-0.0100A	.02 second, Maximum
	0.0125A-6.3A	.02 second, Maximum
	8A-15A	.04 second, Maximum

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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Axial Lead & Cartridge Fuses

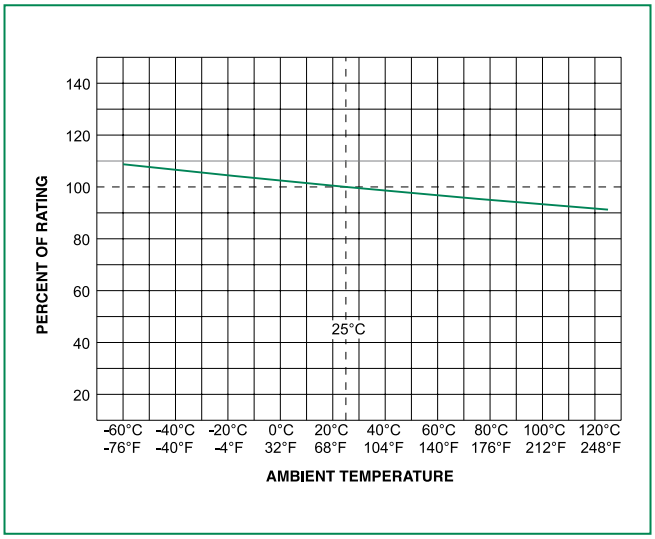
5×20 mm > Fast-Acting > 217 Series

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Maximum Voltage Drop at Rated Current (mV)	Maximum Power Dissipation At 1.5In(W)	Agency Approvals								
.032	0.032	250		262.2000	0.00015	10000	1.6		x	x		x	x	x	x	x
.040	0.04	250		183.1500	0.00008	8000	1.6		x	x		x	x	x	x	x
.050	0.05	250		15.2000	0.00049	7000	1.6		x	x		x	x	x	x	x
.063	0.063	250		10.4500	0.00056	5000	1.6		x	x		x	x	x	x	x
.080	0.08	250		7.8900	0.00132	4000	1.6		x	x		x	x	x	x	x
.100	0.1	250		5.6965	0.00260	3500	1.6		x	x		x	x	x	x	x
.125	0.125	250		3.8200	0.00478	2000	1.6		x	x		x	x	x	x	x
.160	0.16	250		2.5250	0.01000	2000	1.6		x	x		x	x	x	x	x
.200	0.2	250		1.7000	0.02000	1700	1.6		x	x		x	x	x	x	x
.250	0.25	250		1.2325	0.04000	1400	1.6		x	x		x	x	x	x	x
.315	0.315	250	35A @ 250VAC	0.8800	0.11000	1300	1.6		x	x		x	x	x	x	x
.400	0.4	250		0.2770	0.12500	1200	1.6	x	x	x		x	x	x	x	x
.500	0.5	250		0.2065	0.21500	1000	1.6	x	x	x		x	x	x	x	x
.630	0.63	250		0.1900	0.41000	650	1.6	x	x	x		x	x	x	x	x
.800	0.8	250		0.1203	0.85000	240	1.6	x	x	x		x	x	x	x	x
001.	1	250		0.0964	1.04500	200	1.6	x	x	x	x	x	x	x	x	x
1.25	1.25	250		0.0701	2.23000	200	1.6	x	x	x	x	x	x	x	x	x
01.6	1.6	250		0.0528	4.61500	190	1.6	x	x	x	x	x	x	x	x	x
002.	2	250		0.0416	5.73000	170	1.6	x	x	x	x	x	x	x	x	x
02.5	2.5	250		0.0334	9.46000	170	1.6	x	x	x	x	x	x	x	x	x
3.15	3.15	250		0.0224	17.72000	150	2.5	x	x	x	x	x	x	x	x	x
004.	4	250	40A @ 250VAC	0.0165	29.16500	130	2.5	x	x	x	x	x	x	x	x	x
005.	5	250	50A @ 250VAC	0.0137	42.79500	130	2.5	x	x	x	x	x	x	x	x	x
06.3	6.3	250	63A @ 250VAC	0.0095	62.46500	130	2.5	x	x	x	x	x	x	x	x	x
008.	8	250	80A @ 250VAC	0.0068	198.16000	130	4		x		x	x			x	x*
010.	10	250	100A @ 250VAC	0.0063	217.63500	130	4		x		x	x			x	x*
015.	15	250	150A @ 250VAC	0.0040	607.13500	130	4				x				x	x*

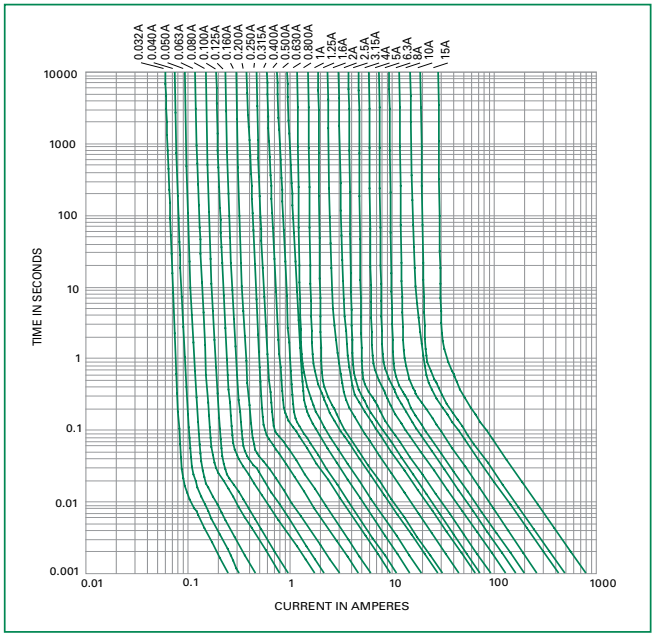
* Approval for cartidge versions only.

Temperature Re-rating Curve



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

Average Time Current Curves



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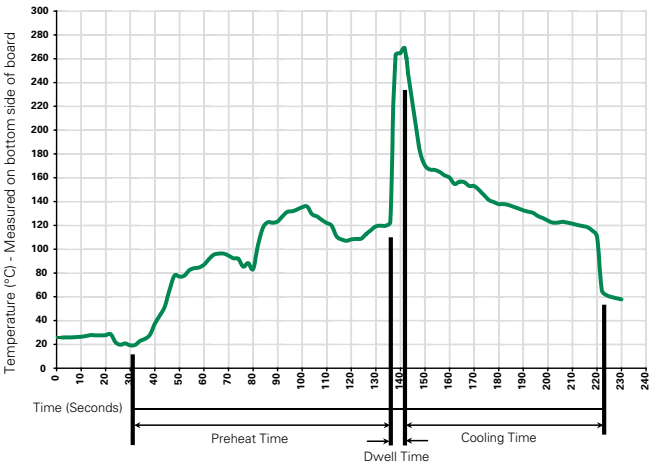
Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Material	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Agency approval marks
Packaging	Available in Bulk (M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A. high RH (95%) and elevated temperature (40°C) for 240 hours.
Salt Spray	MIL-STD-202, Method 101, Test Condition B

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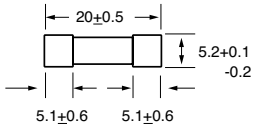
Axial Lead & Cartridge Fuses

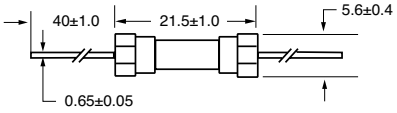
5×20 mm > Fast-Acting > 217 Series

Dimensions

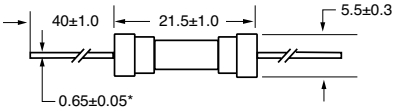
0217 000P



0217.032 XEP to **0217.315 XEP**



0217.400 XEP to 0217015 **XEP**



All dimensions in mm

Notes:
* Ratings above 6.3A have 0.8±0.05 diameter lead.

Part Numbering System

0217 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Codes
Blank = Cartridge Type Fuse
E = Axial Leaded Fuse

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
217 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1000	MRET1	T1=53mm (2.087")
Bulk	N/A	1000	MXG	N/A
Bulk	N/A	1000	MXB	N/A
Bulk	N/A	100	HX	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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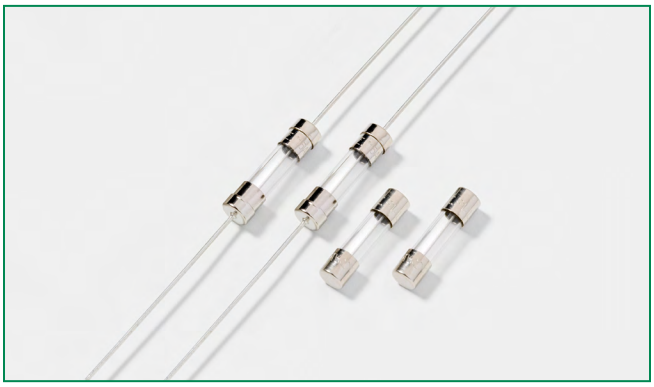
218 Series, 5×20 mm, Time-Lag Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
PS E	Cartridge: NBK090205-E10480A NBK120802-E10480C Leaded: NBK090205-E10480B NBK120802-E10480D	 1A – 5A 6.3A – 15A 1A – 5A 6.3A – 15A
CCC	2005010207145715	0.032A – 6.3A
KC	SU05001-3005 SU05001-2008 SU05001-2009	0.032A – 0.040A 0.050A – 0.800A 1A – 10A
UL	E10480	0.032A – 16A
CSA	29862	0.032A-10A;15A
S	1402476	0.032A – 6.3A
VDE	40013496	0.032A – 10A
VDE	40016604	15A*
KM	KM41462	0.080A – 6.3A
CE	N/A	0.032A – 16A

* Approval for Cartridge versions only

Description

5×20mm Time-Lag glass body cartridge fuse designed to IEC specification.

Features

- Designed to International IEC Standards for use globally
- Meets the IEC 60127-2, Sheet 3 specification for Time-Lag fuses
- Available in cartridge and axial lead form
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristics

% of Ampere Rating	Ampere Rating	Opening Time
150%	0.032A–0.100A	60 minutes, Minimum
	0.125A-6.3A	60 minutes, Minimum
	8A-15A	30 minutes, Minimum
210%	0.032A-0.100A	120 sec., Maximum
	0.125A-6.3A	120 sec., Maximum
	8A-16A	120 sec., Maximum
275%	0.032A-0.100A	200 ms., Min.; 10 sec. Max.
	0.125A-6.3A	600 ms., Min.; 10 sec. Max.
	8A-16A	600 ms., Min.; 10 sec. Max.
400%	0.032A-0.100A	40 ms., Min.; 3 sec. Max.
	0.125A-6.3A	150 ms., Min.; 3 sec. Max.
	8A-15A	150 ms., Min.; 3 sec. Max.
1000%	0.032A-0.100A	10 ms., Min.; 300 ms. Max.
	0.125A-6.3A	20 ms., Min.; 300 ms. Max.
	8A-15A	20 ms., Min.; 300 ms. Max.

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Axial Lead & Cartridge Fuses

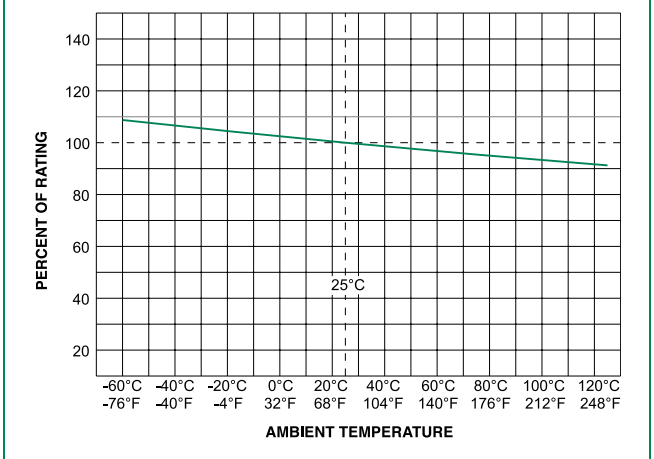
5×20 mm > Time-Lag > 218 Series

Electrical Characteristics

Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Maximum Voltage Drop at Rated Current (mV)	Maximum Power Dissipation At 1.5In(W)	Agency Approvals								
.032	0.032	250		48.2580	0.01100	5000	1.6		x	x		x	x	x	x	x
.040	0.04	250		31.8620	0.01100	4000	1.6		x	x		x	x	x	x	x
.050	0.05	250		21.2920	0.02700	3500	1.6		x	x		x	x	x	x	x
.063	0.063	250		14.2680	0.04600	3000	1.6		x	x		x	x	x	x	x
.080	0.08	250		9.0700	0.07500	2500	1.6	x	x	x		x	x	x	x	x
.100	0.1	250		6.0180	0.07900	2000	1.6	x	x	x		x	x	x	x	x
.125	0.125	250		4.2000	0.1465	1900	1.6	x	x	x		x	x	x	x	x
.160	0.16	250		3.7000	0.14400	1500	1.6	x	x	x		x	x	x	x	x
.200	0.2	250		1.6000	0.3410	1300	1.6	x	x	x		x	x	x	x	x
.250	0.25	250		1.0495	0.5405	1100	1.6	x	x	x		x	x	x	x	x
.315	0.315	250	35 A @ 250 VAC	0.8475	1.1100	1000	1.6	x	x	x		x	x	x	x	x
.400	0.4	250		0.5350	1.3250	900	1.6	x	x	x		x	x	x	x	x
.500	0.5	250		0.3700	2.8250	300	1.6	x	x	x		x	x	x	x	x
.630	0.63	250		0.2750	4.6750	250	1.6	x	x	x		x	x	x	x	x
.800	0.8	250		0.0813	3.370	150	1.6	x	x	x		x	x	x	x	x
001.	1	250		0.0613	6.730	150	1.6	x	x	x	x	x	x	x	x	x
1.25	1.25	250		0.0446	12.650	150	1.6	x	x	x	x	x	x	x	x	x
01.6	1.6	250		0.0336	23.350	150	1.6	x	x	x	x	x	x	x	x	x
002.	2	250		0.0293	14.450	150	1.6	x	x	x	x	x	x	x	x	x
02.5	2.5	250		0.0219	23.250	120	1.6	x	x	x	x	x	x	x	x	x
3.15	3.15	250		0.0173	38.150	100	1.6	x	x	x	x	x	x	x	x	x
004.	4	250	40 A @ 250 VAC	0.0129	69.10	100	1.6	x	x	x	x	x	x	x	x	x
005.	5	250	50 A @ 250 VAC	0.0104	111.00	100	1.6	x	x	x	x	x	x	x	x	x
06.3	6.3	250	63 A @ 250 VAC	0.0076	198.50	100	1.6	x	x	x	x	x	x	x	x	x
008.	8	250	80 A @ 250 VAC	0.0059	341.50	100	4		x		x	x	x		x	x
010.	10	250	100 A @ 250 VAC	0.0045	568.00	100	4		x		x	x	x		x	x
12.5	12.5	250	63 A @ 250 VAC	0.0034	889.00	100	4				x	x			x	
015.	15	250	100 A @ 250 VAC	0.0028	1405.00	100	4				x	x	x		x	x*
016.	16	250	63 A @ 250 VAC	0.0021	1955.00	100	4					x			x	

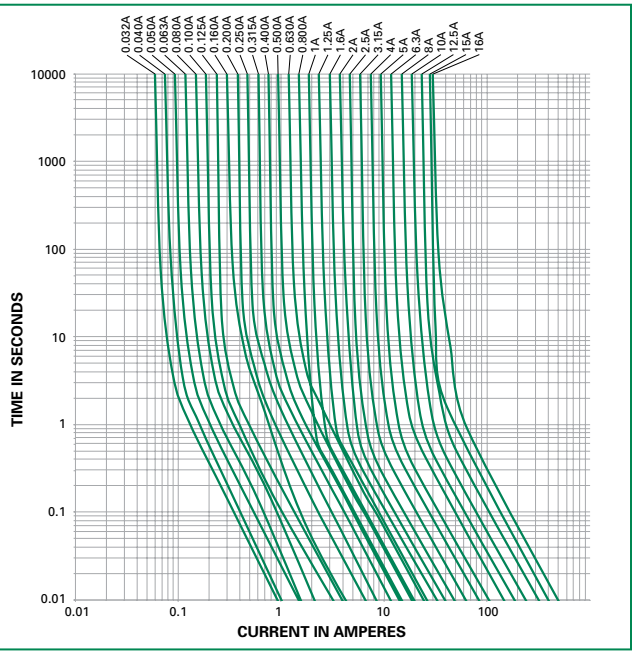
* Approval for cartidge versions only

Temperature Re-rating Curve



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

Average Time Current Curves



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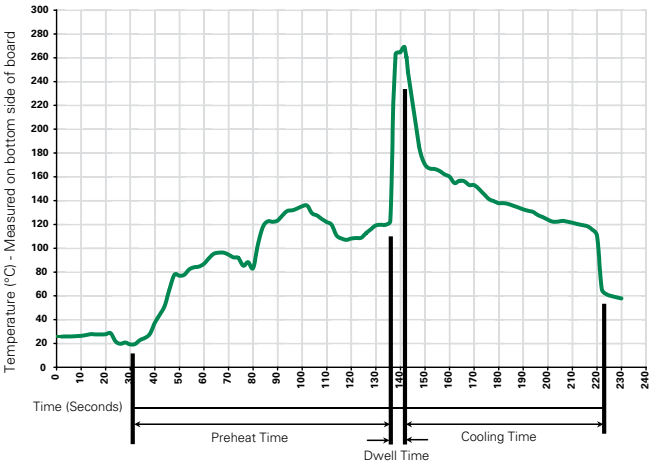
Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Material	**Body:** Glass **Cap:** Nickel–plated Brass **Leads:** Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202, Method 208
Product Marking	**Cap1:** Brand logo, current and voltage ratings **Cap2:** Agency approval marks
Packaging	Available in Bulk (M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A (High RH (95%) and elevated temperature (40°C) for 240 hours)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

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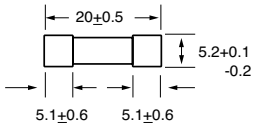
Axial Lead & Cartridge Fuses

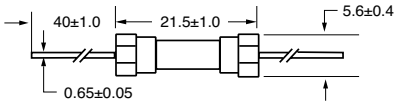
5×20 mm > Time-Lag > 218 Series

Dimensions

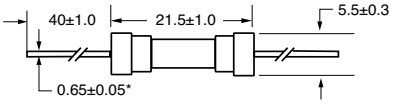
0218 000P



0218.032 **XEP**
to
0218.100**XEP**



0218.125 **XEP**
to
0218016**. XEP**



All dimensions in mm

Notes:
* Ratings above 6.3A have 0.8±0.05 diameter lead.

Part Numbering System

0218 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Codes
Blank : Cartidge Type Fuse
E : Axial Lead Fuse

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
218 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1000	MRET1	T1=53mm (2.087")
Bulk	N/A	1000	MXG	N/A
Bulk	N/A	1000	MXB	N/A
Bulk	N/A	100	HX	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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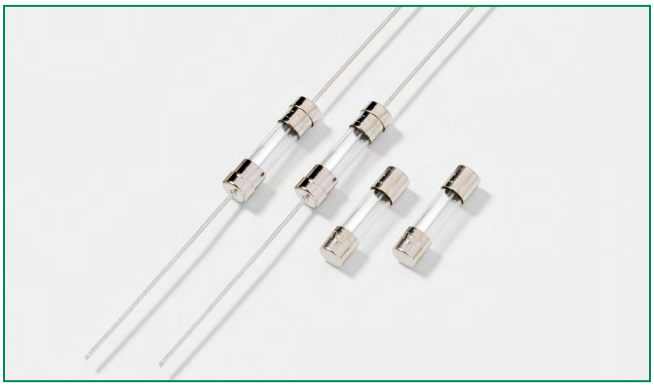
213 Series, 5×20 mm, Time-Lag Fuse



Description

5×20mm time-Lag surge withstand glass body cartridge fuse designed to IEC specification.

Features

- Designed to International (IEC) Standards for use globally
- Available in cartridge and axial lead form
- Meets the IEC 60127-2, Sheet 3 specification for time-Lag fuses
- RoHS compliant and lead-free.

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

Agency	Agency File Number	Ampere Range
PS E	Cartridge: NBK090205-E10480A NBK120802-E10480C Leaded: NBK090205-E10480B NBK120802-E10480D	1A-5A 6.3A 1A-5A 6.3A
CCC	2003010207045592	0.200A – 6.3A
UL	E10480	0.200A – 6.3A
CSA	029862	
S	1403414	
VDE	40015638	0.200A – 6.3A
KM	KM41462	0.200A – 6.3A
KC	SU05001-12002 SU05001-12001	3.15A-5A 6.3A
CE	N/A	0.200A – 6.3A

Electrical Characteristic for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	All Ratings	60 minutes, Minimum
210%		2 minutes, Maximum
275%		0.6 sec., Min.; 10 sec. Max.
400%		.15 sec., Min.; 3 sec. Max.
1000%		0.02 sec., Min.; 0.3 sec. Max.

Additional Information

Datasheet | Resources | Samples

Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Maximum Voltage Drop at Rated Current (mV)	Maximum Power Dissipation at 1.5In (W)	Agency Approvals								
.200	0.2	250	35A@250Vac	1.6000	0.22500	1500	1.6	x	x		x	x	x	x		x
.250	0.25	250		1.0495	0.55500	1300	1.6	x	x		x	x	x	x		x
.315	0.315	250		0.8475	1.14000	1100	1.6	x	x		x	x	x	x	x	x
.400	0.4	250		0.5350	1.36000	1000	1.6	x	x		x	x	x	x	x	x
.500	0.5	250		0.3700	2.90500	900	1.6	x	x		x	x	x	x	x	x
.630	0.63	250		0.2750	4.80000	300	1.6	x	x		x	x	x	x	x	x
.800	0.8	250		0.1635	9.42000	250	1.6	x	x		x	x	x	x	x	x
001.	1	250		0.1165	19.20000	150	1.6	x	x	x	x	x	x	x	x	x
1.25	1.25	250		0.0817	27.15000	150	1.6	x	x	x	x	x	x	x	x	x
01.6	1.6	250		0.0551	44.20000	150	1.6	x	x	x	x	x	x	x	x	x
002.	2	250		0.0452	92.70500	150	1.6	x	x	x	x	x	x	x	x	x
02.5	2.5	250		0.0305	138.00000	120	1.6	x	x	x	x	x	x	x	x	x
3.15	3.15	250		0.0231	202.00000	100	1.6	x	x	x	x	x	x	x	x	x
004.	4	250	40A@250Vac	0.0170	226.50500	100	1.6	x	x	x	x	x	x	x	x	x
005.	5	250	50A@250Vac	0.0116	314.00000	100	1.6	x	x	x	x	x	x	x	x	x
06.3	6.3	250	63A@250Vac	0.0095	600.00000	100	1.6	x	x	x	x	x	x	x	x	x

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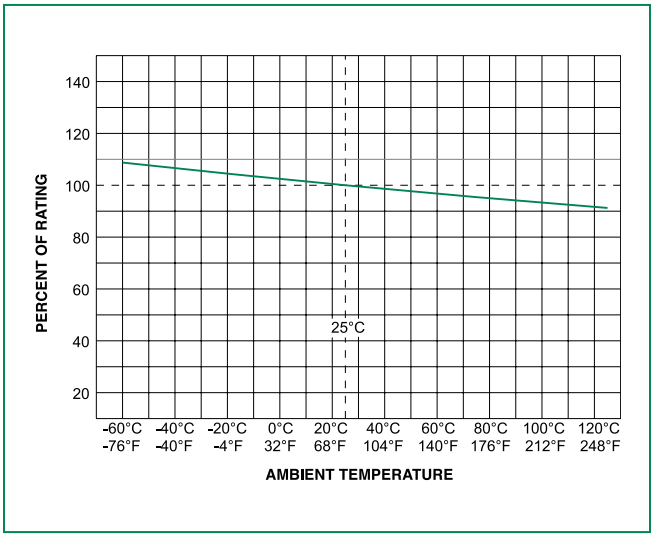
Axial Lead & Cartridge Fuses

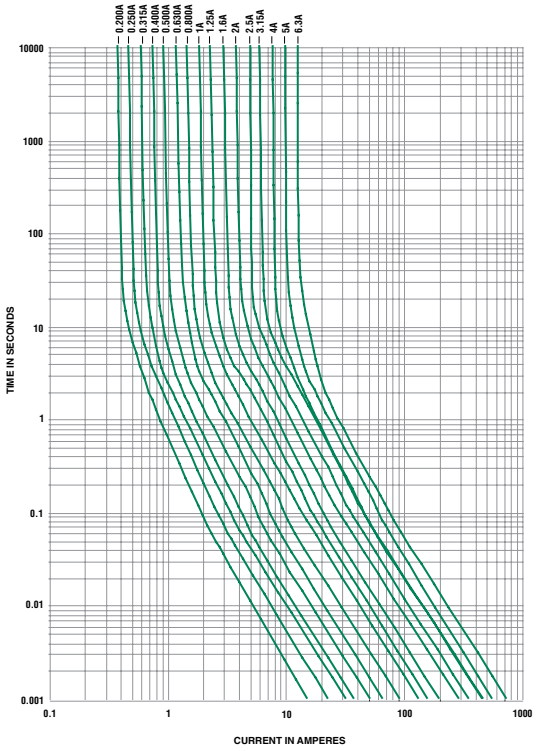
5×20 mm > Time-Lag > 213 Series

Temperature Re-rating Curve

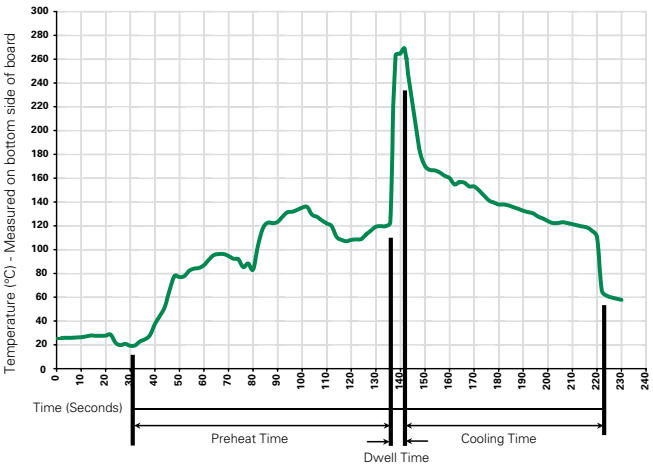


Note:
1. Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100° C
Temperature Maximum:	150° C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260° C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350° C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

5×20 mm > Time-Lag > 213 Series

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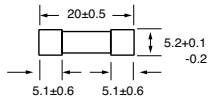
Product Characteristics

Material	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202, Method 208
Product Marking	Cap1: Brand logo, current and voltage Cap2: Agency approval marks Series
Packaging	Available in Bulk (M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

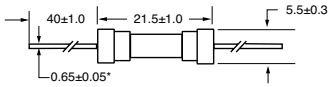
Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A. High RH (95%) and elevated temperature (40°C) for 240 hours.
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

0213 000P



0213 000 **XEP**



Note:
- All dimensions in mm

Part Numbering System

0213 xxxx M X E P

- **Series**
- **Amp Code**: Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code**: M = 1000
- **Packaging Code**: X = Filler
- **Option Codes**: Blank : Cartidge Type Fuse; E : Axial Leaded Fuse
- **Lead-free**

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
213 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	N/A	1000	MRET1	T1=53mm (2.087")
Bulk	N/A	1000	MXG	N/A
Bulk	N/A	1000	MXB	N/A
Bulk	N/A	100	HX	N/A

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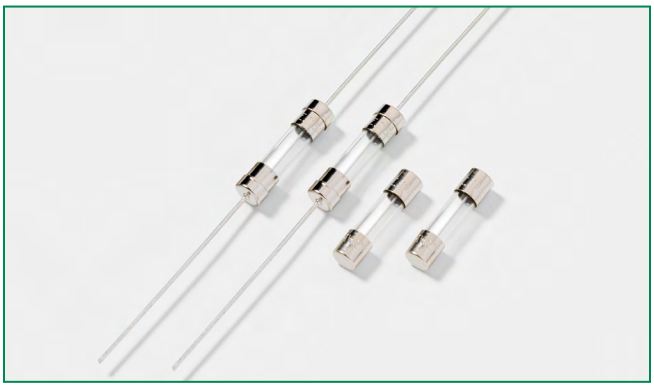
219XA Series, 5×20mm, Time-Lag Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
	Cartridge: NBK220604-E10480A NBK120802-E10480C Leaded: NBK220604-E10480B NBK120802-E10480D	1A – 5A 6.3A 1A – 5A 6.3A
	2004010207110266 2003010207079982	0.125A – 0.800A 1A – 6.3A
	E10480	0.040A – 6.3A
	29862	0.125A – 6.3A
	1402844	0.040A – 6.3A
	40016080	0.040A – 6.3A
	KM41462	0.125A – 6.3A
	N/A	0.040A – 6.3A

Description

5×20mm time-Lag glass body cartridge fuse designed to IEC specification.

Features

- Designed to International IEC Standards for use globally
- Meets the IEC 60127-2, Sheet 6 specification for time-Lag fuses
- Available in cartridge and axial lead form
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	0.04A - 0.1A	1 hours, Minimum
	0.125A – 6.3A	1 hours, Minimum
210%	0.04A - 0.1A	2 minutes, Maximum
	0.125A – 6.3A	2 minutes, Maximum
275%	0.04A - 0.1A	0.2 sec., Min; 10 sec. Max
	0.125A – 6.3A	0.6 sec., Min; 10 sec. Max
400%	0.04A - 0.1A	0.04 sec., Min; 3 sec. Max
	0.125A – 6.3A	.15 sec., Min; 3 sec. Max
1000%	0.04A - 0.1A	.01 sec., Min; 0.3 sec. Max
	0.125A – 6.3A	.02 sec., Min; 0.3 sec. Max

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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Revised: 03/03/17

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Maximum Voltage Drop at Rated Current (mV)	Maximum Power Dissipation at 1.5In (W)	Agency Approvals							
.040	0.040	250	150A @ 250VAC	31.8620	0.01640	4000	1.6			x		x		x	
.050	0.050	250		21.2920	0.01700	3500	1.6			x		x		x	
.063	0.063	250		14.2685	0.03800	3000	1.6			x		x		x	
.100	0.100	250		6.0180	0.07900	2500	1.6			x		x		x	
.125	0.125	250		4.2000	0.13000	2000	1.6	x		x	x	x	x	x	x
.160	0.160	250		2.5500	0.31000	1900	1.6	x		x	x	x	x	x	x
.200	0.200	250		1.6000	0.32000	1500	1.6	x		x	x	x	x	x	x
.250	0.250	250		1.0495	0.54000	1300	1.6	x		x	x	x	x	x	x
.315	0.315	250		0.8475	1.23000	1100	1.6	x		x	x	x	x	x	x
.400	0.400	250		0.5350	1.40000	1000	1.6	x		x	x	x	x	x	x
.500	0.500	250		0.3700	3.00000	900	1.6	x		x	x	x	x	x	x
.630	0.630	250		0.2750	4.82000	300	1.6	x		x	x	x	x	x	x
.800	0.800	250		0.1635	9.35000	250	1.6	x		x	x	x	x	x	x
001.	1.00	250		0.1165	19.20000	150	1.6	x	x	x	x	x	x	x	x
1.25	1.25	250		0.0817	27.15000	150	1.6	x	x	x	x	x	x	x	x
01.6	1.60	250		0.0551	44.20000	150	1.6	x	x	x	x	x	x	x	x
002.	2.00	250		0.0452	92.70500	150	1.6	x	x	x	x	x	x	x	x
02.5	2.50	250		0.0305	138.00000	120	1.6	x	x	x	x	x	x	x	x
3.15	3.15	250		0.0231	202.00000	100	1.6	x	x	x	x	x	x	x	x
004.	4.00	250		0.0158	330.00000	100	1.6	x	x	x	x	x	x	x	x
005.	5.00	250		0.0117	544.00000	100	1.6	x	x	x	x	x	x	x	x
06.3	6.3	250		0.0107	1093.03500	100	1.6	x	x	x	x	x	x	x	x

*4A-6.3A have an Interrupting rating 100A@350Vac.

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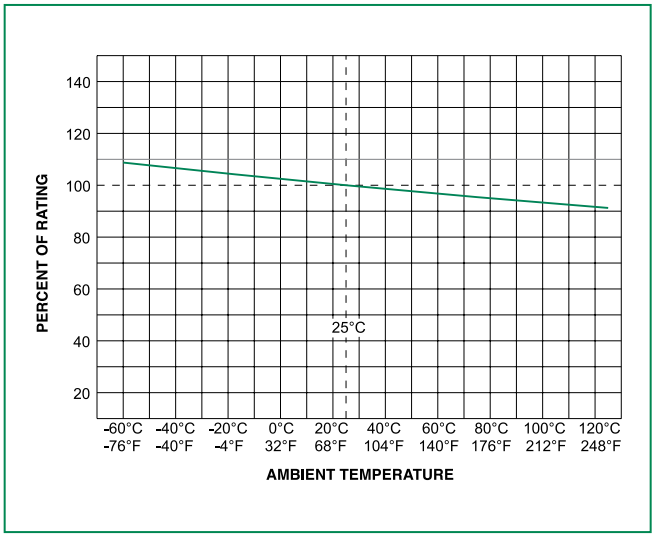
Axial Lead & Cartridge Fuses

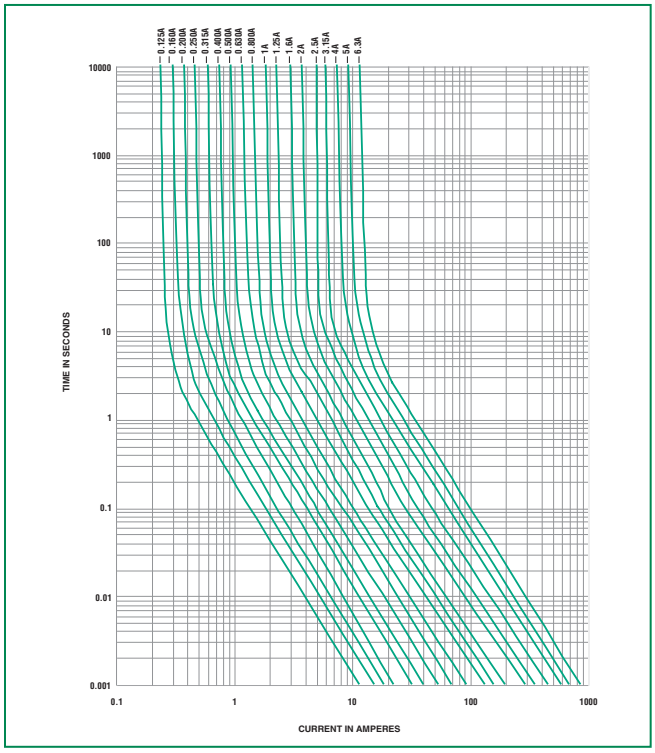
5×20 mm > Time-Lag > 219XA Series

Temperature Re-rating Curve

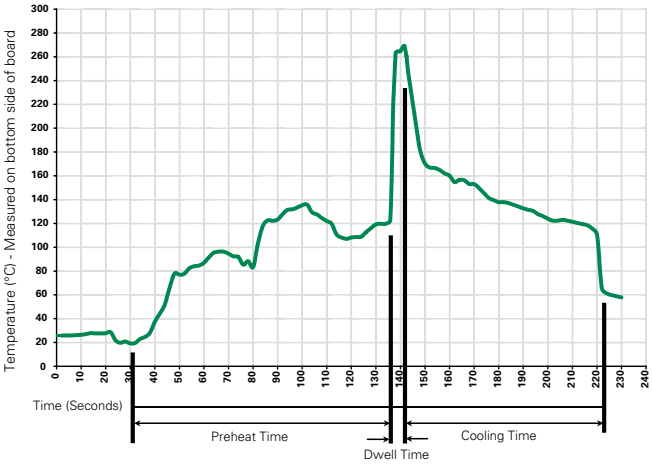


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
219XA Series				
Bulk	N/A	1000	MXA	N/A
Bulk	N/A	1000	MXAE	N/A
Reel and Tape	EIA 296-E	1000	MRAET1	T1=53mm (2.087")
Bulk	N/A	1000	MXG	N/A

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Axial Lead & Cartridge Fuses

5×20 mm > Time-Lag > 219XA Series

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Product Characteristics

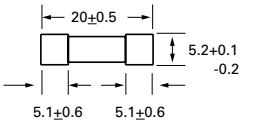
Materials	Body: Glass Cap: Nickel Plated Brass Leads: Tin Plated Copper
Terminal Strength	MIL-STD-202, Method 211. Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap 1: Brand logo, current and voltage rating Cap 2: Agency approval markings Series
Packaging	Available in Bulk (M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

Operating Temperature	–55°C to +125°C
Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A high RH (95%) and elevated temperature (40° C) for 240 hours.
Salt Spray	MIL-STD-202 Method 101, Test Condition B

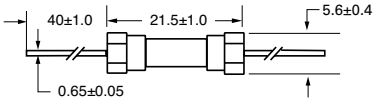
Dimensions

All dimensions in mm

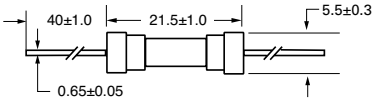
0219 000XAP



0219.040**XAEP** to **0219**.100**XAEP**



0219.125**XAEP** to **0219**06.3**XAEP**



Part Numbering System

0219 xxxx M XA E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Lead-free

Option Codes
Blank : Cartidge Type Fuse
E : Axial Leaded Fuse

Packaging Code
X = Filler
A = Enhanced l sq t

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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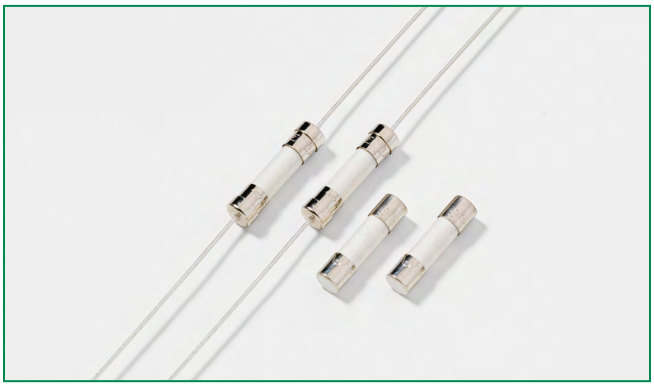
216 Series, 5×20 mm, Fast-Acting Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
PSE	Cartridge: 1-5A NBK 090205-E10480A 6.3A-10A NBK 250702-E10480E 12.5A NBK 240108-JP1021C 16A NBK 240108-JP1021E Leaded: 1-5A NBK 090205-E10480B 6.3A-10A NBK 250702-E10480F 12.5A NBK 240108-JP1021D 16A NBK 240108-JP1021F	1A – 16A
CCC	2003010207079960	0.05A – 6.3A
KC	SU05001-2013	1A – 10A
cULus	E10480	0.05A – 16A
CSA	29862	
S	1402843	0.05A - 10A, 16A
DVE	40013834	0.05A – 6.3A *8A, *10A
VDE	40016442	*12.5A
KM	KM41462	1A – 6.3A
J	J50248090	8A – 16A
CE	N/A	0.05A – 16A

*Approval for Cartridge versions only

Description

5×20mm fast-acting ceramic body cartridge fuse designed to IEC specification.

Features

- Designed to International (IEC) Standards for use globally
- Meets the IEC 60127-2, sheet 1 specification for fast-acting fuses
- Available in cartridge and axial lead form
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	0.05A – 4A	60 minutes, Minimum
	5A – 6.3A	60 minutes, Minimum
	8A – 16A	30 minutes, Minimum
210%	0.05A – 4A	30 minutes, Maximum
	5A – 6.3A	30 minutes, Maximum
	8A – 16A	30 minutes, Maximum
275%	0.05A – 4A	0.01 sec.., Min.; 2 sec. Max.
	5A – 6.3A	0.01 sec.., Min.; 3 sec. Max.
	8A – 16A	0.04 sec., Min.; 20 sec. Max.
400%	0.05A – 4A	.003 sec., Min.; 0.3 sec. Max.
	5A – 6.3A	.003 sec., Min.; 0.3 sec. Max.
	8A – 16A	.01 sec.., Min.; 1.0 sec. Max.
1000%	0.05A – 4A	.02 seconds, Maximum
	5A – 6.3A	.02 seconds, Maximum
	8A – 16A	.03 sec.onds, Maximum

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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Electrical Characteristics Specifications by Item

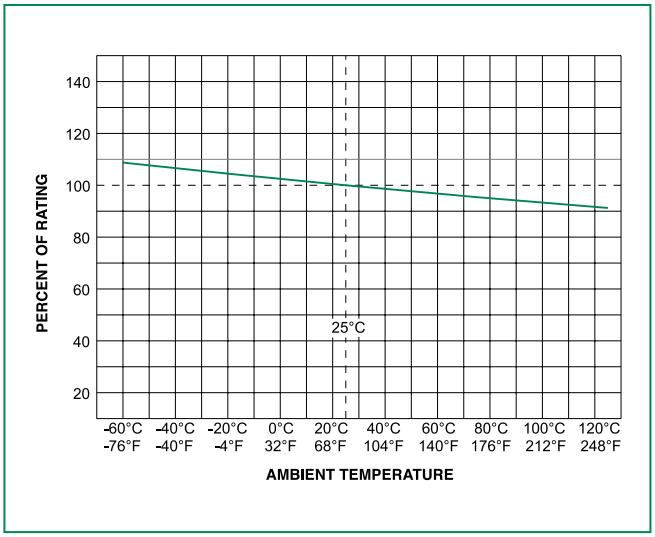
Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Maximum Voltage Drop at Rated Current (mV)	Maximum Power Dissapation at 1.5In (W)	Agency Approvals									
.050	0.05	250	1500A@ 250Vac	15.9000	0.00019	10000	1.6			x	x	x	x	x	x			
.063	0.063	250		10.4500	0.00079	8800	1.6			x	x	x	x	x	x			
.080	0.08	250		7.8850	0.00084	7600	1.6			x	x	x	x	x	x			
.100	0.1	250		5.7925	0.00450	7000	1.6			x	x	x	x	x	x			
.125	0.125	250		3.6750	0.00546	5000	1.6			x	x	x	x	x	x			
.160	0.16	250		5.3490	0.00326	4300	1.6			x	x	x	x	x	x			
.200	0.2	250		3.3500	0.00439	3500	1.6			x	x	x	x	x	x			
.250	0.25	250		2.3500	0.01350	2800	2.5			x	x	x	x	x	x			
.315	0.315	250		1.8500	0.02320	2500	2.5			x	x	x	x	x	x			
.500	0.5	250		0.8660	0.16500	1800	2.5			x	x	x	x	x	x			
.630	0.63	250		0.4650	0.05940	1500	2.5			x	x	x	x	x	x			
.800	0.8	250		0.2950	0.14600	1200	2.5			x	x	x	x	x	x			
001.	1	250		0.2370	0.18000	1000	2.5	x	x	x	x	x	x	x	x			x
1.25	1.25	250		0.1530	0.48000	800	4	x	x	x	x	x	x	x	x			x
01.6	1.6	250		0.1112	1.00500	600	4	x	x	x	x	x	x	x	x			x
002.	2	250		0.0764	1.87000	500	4	x	x	x	x	x	x	x	x			x
02.5	2.5	250		0.0584	3.67200	400	4	x	x	x	x	x	x	x	x			x
3.15	3.15	250		0.0368	6.70000	350	4	x	x	x	x	x	x	x	x			x
004.	4	250		0.0247	14.99500	300	4	x	x	x	x	x	x	x	x			x
005.	5	250		0.0183	27.46000	250	4	x	x	x	x	x	x	x	x			x
06.3	6.3	250		0.0137	56.43000	200	4	x	x	x	x	x	x	x	x			x
008.	8	250		0.0123	64.31500	200	4		x		x	x	x	x	x*		x	x
010.	10	250		0.0079	154.34000	200	4		x		x	x	x	x	x*		x	x
12.5	12.5	250		0.0057	175.00000	200	N/A**				x	x		x		x*	x	x
016.	16	250	750A@ 250Vac	0.0040	462.50000	200	N/A**				x	x	x	x			x	x

* Approval for cartidge versions only.

N/A** - Please contact Littelfuse for details on these parameters

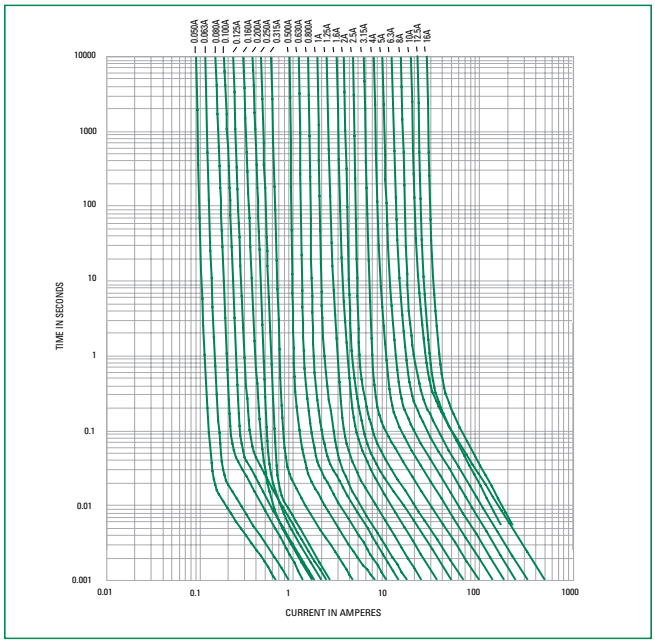
I^2t test at 10x rated current

Temperature Re-rating Curve



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

Average Time Current Curves



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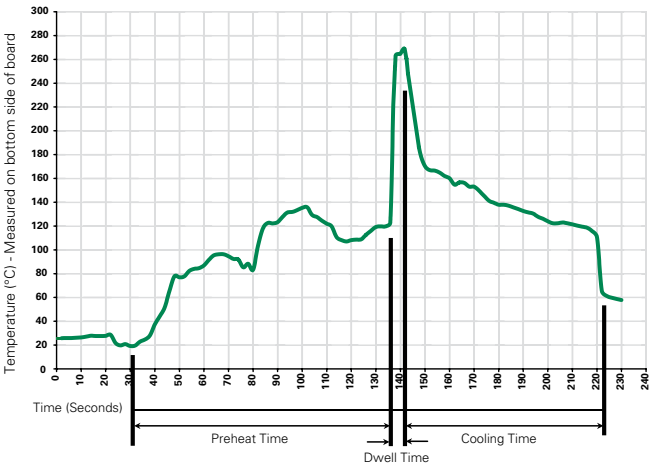
Axial Lead & Cartridge Fuses

5×20 mm > Fast-Acting > 216 Series

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Material	Body: Ceramic Cap: Nickel–plated brass Leads: Tin–plated Copper Filler (160mA-16A): Sand
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap 1: Brand logo, current and voLage rating Cap 2: Agency approval markings
Packaging	Available in Bulk (M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A. high RH (95%) and elevated temperature (40°C) for 240 hours.
Salt Spray	MIL-STD-202, Method 101, Test Condition B

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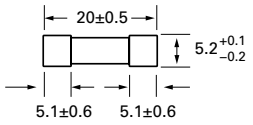
Axial Lead & Cartridge Fuses

5×20 mm > Fast-Acting > 216 Series

Littelfuse
Expertise Applied | Answers Delivered

Dimensions

0216 000XP



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to
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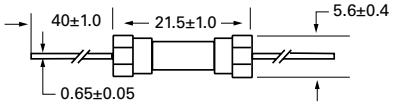

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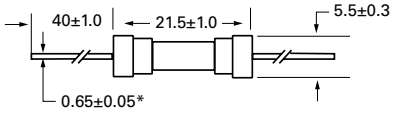

All dimensions in mm

Notes:
* Ratings above 6.3 A have 0.8 ± 0.05 diameter lead.

Part Numbering System

0216 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Codes
Blank : Cartidge Type Fuse
E : Axial Leaded Fuse

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
216 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1000	MRET1	T1=53mm (2.087")
Bulk	N/A	1000	MXG	N/A
Bulk	N/A	1000	MXB	N/A
Bulk	N/A	100	HX	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20A
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact Littelfuse for applications greater than the max voltage and amperage shown.

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216SP Series, 5×20 mm, Fast-Acting Fuse

Description

5×20mm fast-acting ceramic body cartridge fuse Designed to IEC specification

Features

- Designed to International (IEC) Standards for use globally
- High breaking capacity
- Meets the IEC 60127-2, Sheet 1 specification for Fast-Acting fuses
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

Agency		Ampere Range
PSE	NBK080205-E10480B NBK250702-E10480F	1A – 5A 6.3A – 10A
CQC	CQC10012049970	1A – 10A
KC	SU05001-11001A SU05001-11002A	1A – 2.5A 3.15A – 6.3A
cULus	E10480	1A – 10A
CSA	29862	1A – 10A
VDE	40013834	1 – 6.3A
	J50248090	8A/10A
CE	N/A	1A – 10A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
210%	1A – 4A	30 minutes, Maximum
	5A – 6.3A	30 minutes, Maximum
	8A – 10A	30 minutes, Maximum
275%	1A – 4A	0.01 sec.., Min.; 2 sec. Max.
	5A – 6.3A	0.01 sec.., Min.; 3 sec. Max.
	8A – 10A	0.04 sec., Min.; 20 sec. Max.
400%	1A – 4A	.003 sec., Min.; 0.3 sec. Max.
	5A – 6.3A	.003 sec., Min.; 0.3 sec. Max.
	8A – 10A	.01 sec.., Min.; 1.0 sec. Max.
1000%	1A – 4A	.02 seconds, Maximum
	5A – 6.3A	.02 seconds, Maximum
	8A – 10A	.03 sec.onds, Maximum

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating	Voltage Rating	Interrupting Rating	Nominal Resistance Cold Ohms (Ohms)	Nominal Melting I^2t (A^2 sec)	Maximum Voltage Drop at Rated Current (mV)	Maximum Power Dissapation at 1.5In (W)	Agency Approvals							
								PSE	CQC	KC	cULus	CSA	VDE		CE
001	1	250	1500 A @ 250 VAC	0.2370	0.18000	1000	2.5	x	x	x	x	x	x		x
01.6	1.6	250		0.1112	1.00500	600	4	x	x	x	x	x	x		x
002	2	250		0.0764	1.87000	500	4	x	x	x	x	x	x		x
02.5	2.5	250		0.0584	3.67200	400	4	x	x	x	x	x	x		x
3.15	3.15	250		0.0368	6.70000	350	4	x	x	x	x	x	x		x
004	4	250		0.0247	14.99500	300	4	x	x	x	x	x	x		x
005	5	250		0.0183	27.46000	250	4	x	x	x	x	x	x		x
06.3	6.3	250		0.0137	56.43000	200	4	x	x	x	x	x	x		x
008	8	250		0.0123	64.31500	200	4	x	x		x	x		x	x
010	10	250		0.0079	154.34000	200	4	x	x		x	x		x	x

I^2t test at 10x rated current

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Application testing is strongly recommended. Specifications are subject to change without notice.
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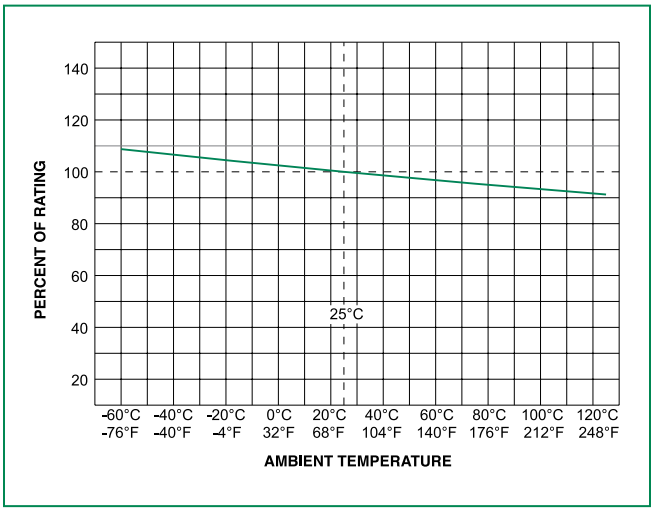
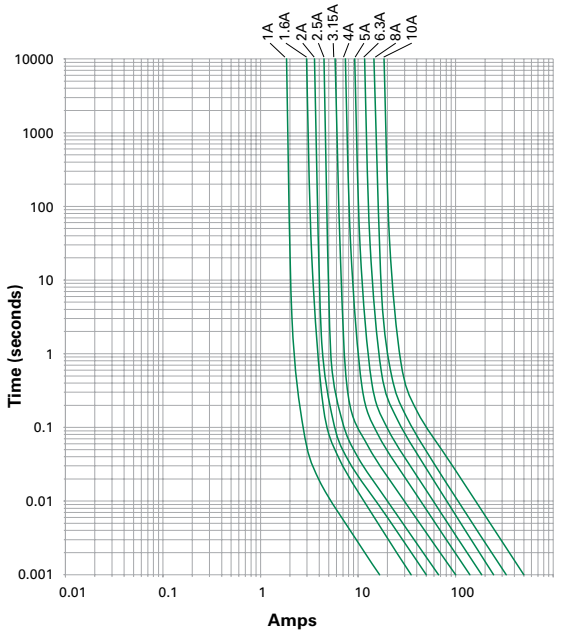
Temperature Re-rating Curve

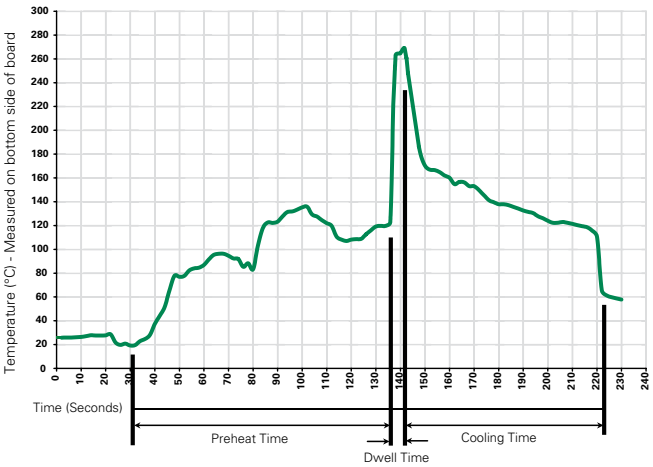


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

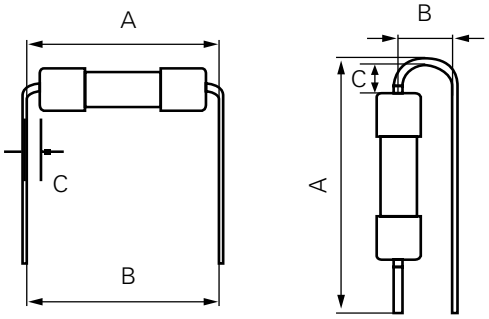
Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Different values of A and B available, please contact the Littelfuse sales representative in your region:



For the pigtailed fuse, please follow the recommendations below for axial lead forming and mounting into PCB:

Lead forming:

The distance C between cap flat surface and axial lead shall be greater than 1.0 mm.

PCB mounting:

According to the standard of IPC-A-610, the distance between PCB and fuse cap is recommended to be a minimum of 1.5 mm.

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

5×20 mm > Fast-Acting Fuse > 216SP Series

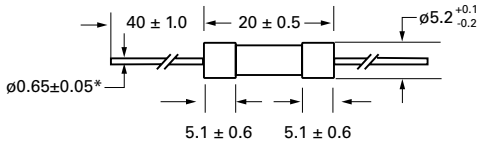
Product Characteristics

Materials	**Body:** Ceramic **Cap:** Nickel–plated Brass **Leads:** Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	**Cap 1:** Brand logo, current and voltage ratings **Cap 2:** Agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A (High RH (95%) and elevated temp (40°C) for 240 hours)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

All dimensions in mm



Notes:
* Ratings 8A and 10A have 0.8 ± 0.05 diameter lead.

Part Numbering System

0216 xxxx M X E SP P

- **Series**
- **Current Rating Code** — Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code** — M = 1000
- **Packaging Code** — X = Filler
- **Option Codes** — Blank : Cartidge Type Fuse; E : Axial Leaded Fuse
- **Single-Cap Pigtail**
- **Lead-Free**

Packaging

Packaging Option	Packaging Specification	Quantity	Packaging Code	Reel Size
216SP Series				
Bulk	N/A	1000	MXE	N/A

Additional Information

Datasheet | **Resources** | **Samples**

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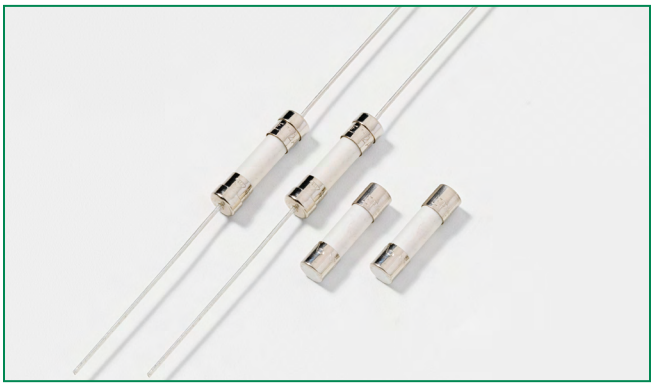
215 Series, 5×20 mm, Time-Lag Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
PSE	Cartridge: NBK080205-E10480A NBK250702-E10480E NBK100408-JP1021A Leaded: NBK080205-E10480B NBK250702-E10480F NBK100408-JP1021B	1A – 5A 6.3A – 15A 16A – 20A 1A – 5A 6.3A – 15A 16A – 20A
CCC	2005010207145714	1A – 6.3A
CQC	CQC07012021808	8A – 10A
KC	SU05001-2011B SU05001-10001 SU05001-10002 SU05001-2012B	1A – 2.5A 3.15A – 6.3A 8A 4A - 10A
cULus	E10480	0.125A - 20A
CSA	29862	0.5A – 12A
S	1517218	0.125A-12A 15A*, 16A*, 20A*
VDE	40013521	0.2A – 8A *10A
VDE	40016610	*12A
KTL	KM41462	0.200A – 10A
J	J50258578	16A/20A
CE	N/A	0.125A – 20A

* Approved for cartridge versions only

Description

5×20mm Time-Lag surge withstand ceramic body cartridge fuse designed to IEC specification

Features

- Designed to International (IEC) Standards for use globally
- High breaking capacity
- Meets the IEC 60127-2, Sheet 5 specification for Time-Lag fuses
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	0.125A – 0.800A	60 minutes, Minimum
	1A – 3.15A	60 minutes, Minimum
	4A – 6.3A	60 minutes, Minimum
	8A – 20A	30 minutes, Minimum
210%	0.125A – 0.800A	30 minutes, Maximum
	1A – 3.15A	30 minutes, Maximum
	4A – 6.3A	30 minutes, Maximum
	8A – 20A	30 minutes, Maximum
275%	0.125A – 0.800A	.25 sec. Min.; 80 secs. Max.
	1A – 3.15A	.75 sec. Min.; 80 secs. Max.
	4A – 6.3A	.75 sec. Min.; 80 secs. Max.
	8A – 20A	.75 sec. Min.; 80 secs. Max.
400%	0.125A – 0.800A	.05 sec., Min.; 5 secs. Max.
	1A – 3.15A	.095 sec., Min.; 5 secs. Max.
	4A – 6.3A	.150 sec., Min.; 5 secs. Max.
	8A – 20A	.150 sec., Min.; 5 secs. Max.
1000%	0.125A – 0.800A	.005 sec., Min.; .150 sec. Max.
	1A – 3.15A	.010 sec., Min.; .150 sec. Max.
	4A – 6.3A	.010 sec., Min.; .150 sec. Max.
	8A – 20A	.010 sec., Min.; .150 sec. Max.

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

5×20 mm > Time-Lag > 215 Series

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Maximum Voltage Drop at Rated Current (mV)	Maximum Power Dissipation at 1.5In (W)	Agency Approvals											
.125	0.125	250	1500 A @ 250 VAC	11.4455	0.0330	2600	1.6					x		x					x
.160	0.16	250		7.1000	0.0465	2400	1.6					x		x					x
.200	0.2	250		1.8400	0.340	2100	1.6	x				x		x	x				x
.250	0.25	250		1.2400	0.545	1500	1.6	x				x		x	x				x
.315	0.315	250		0.8800	0.975	1100	1.6	x				x		x	x				x
.400	0.4	250		0.5825	1.325	1000	1.6	x				x		x	x				x
.500	0.5	250		1.1675	0.420	850	1.6	x				x	x	x	x				x
.630	0.63	250		0.7200	0.635	650	1.6	x				x	x	x	x				x
.800	0.8	250		0.4675	0.975	500	1.6	x				x	x	x	x				x
001.	1	250		0.1515	1.520	350	2.5	x	x	x	x	x	x	x	x				x
1.25	1.25	250		0.1074	3.200	300	2.5	x	x	x	x	x	x	x	x				x
01.6	1.6	250		0.0707	6.830	200	2.5	x	x	x	x	x	x	x	x				x
002.	2	250		0.0566	11.680	190	2.5	x	x	x	x	x	x	x	x				x
02.5	2.5	250		0.0386	22.290	180	2.5	x	x	x	x	x	x	x	x				x
3.15	3.15	250		0.0283	43.255	140	4	x	x	x	x	x	x	x	x				x
004.	4	250		0.0185	46.960	100	4	x	x	x	x	x	x	x	x				x
005.	5	250		0.0153	66.095	100	4	x	x	x	x	x	x	x	x				x
06.3	6.3	250		0.0108	128.750	100	4	x	x	x	x	x	x	x	x				x
008.	8	250		0.0092	209.880	100	4	x	x		x	x	x	x	x		x		x
010.	10	250		0.0066	333.565	100	4	x	x		x	x	x	x	x*		x		x
012.	12	250		0.0061	515.500	100	4		x			x	x	x		x*			x
015.	15	250	500 A @ 250Vac	0.0033	1237.0	N/A**	N/A**		x			x		x*					x
016.	16	250		0.0031	1408.0	N/A**	N/A**		x			x		x*				x	x
020.	20	250	400 A @ 250Vac	0.0023	2600.0	N/A**	N/A**		x			x		x*				x	x

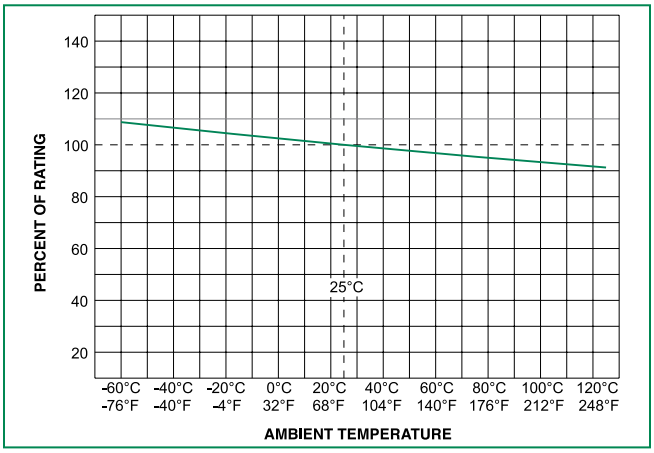
X* Approval for cartridge versions only

N/A** - Please contact Littelfuse for details on these parameters

1A to 2A have an IR : 100A@500VAC, 4A to 6-3A have the IR : 100A@305 VAC and 1000A@72VDC

I^2t test at 10x rated current.

Temperature Re-rating Curve



Product Characteristics

Materials	**Body:** Ceramic **Cap:** Nickel–plated Brass **Leads:** Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	**Cap 1:** Brand logo, current and voltage ratings **Cap 2:** Agency approval markings
Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A (High RH (95%) and elevated temp (40°C) for 240 hours)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

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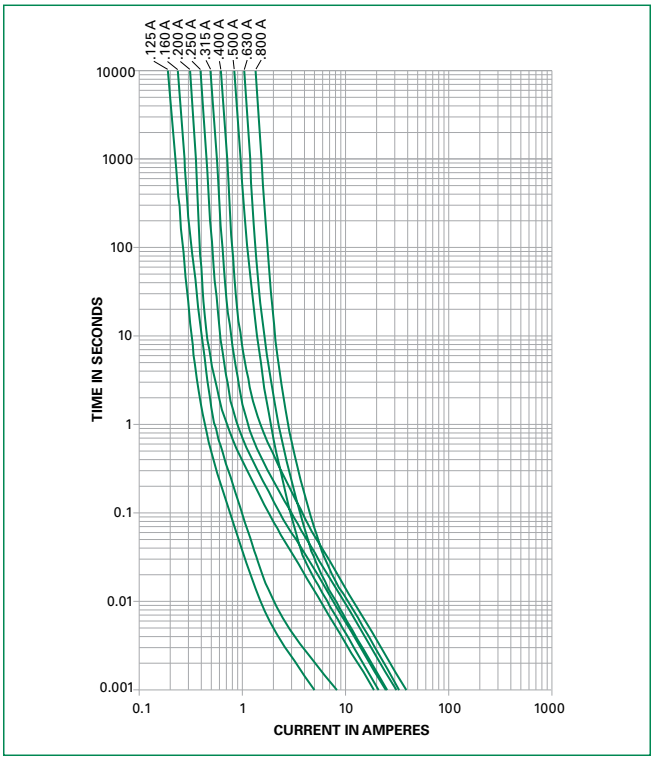
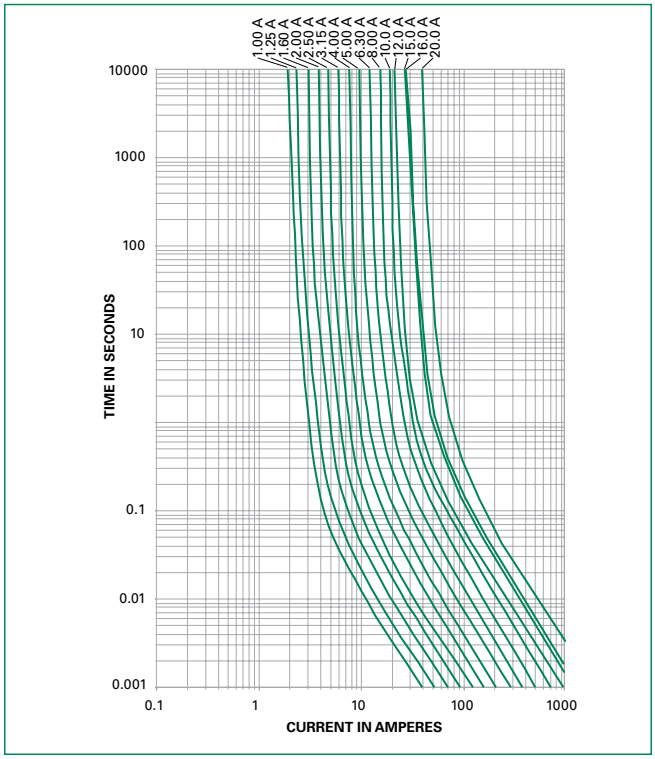
Average Time Current Curves

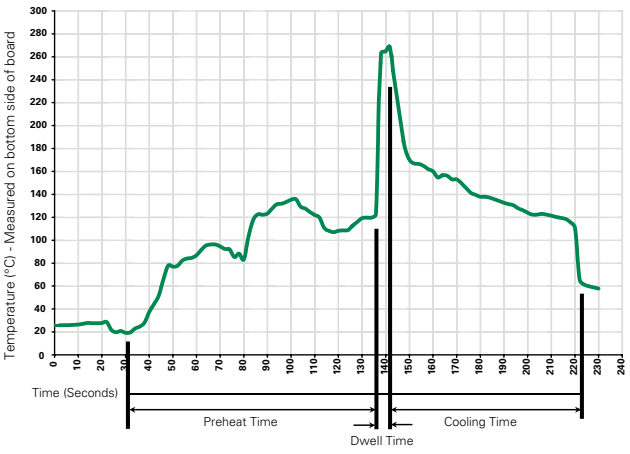
T-C Curves for 125mA to 800mA only



T-C Curves for 1A to 20A only



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

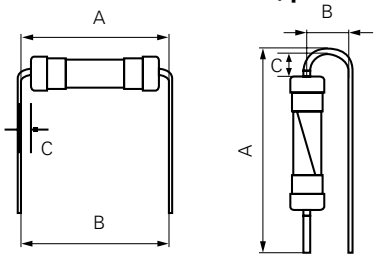
Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100° C
Temperature Maximum:	150° C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260° C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350° C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Different values of A and B available, please contact the Littelfuse sales representative in your region:



For the pigtailed fuse, please follow the recommendations below for axial lead forming and mounting into PCB:

Lead forming:

The distance C between cap flat surface and axial lead shall be greater than 1.0 mm.

PCB mounting:

The distance between PCB and fuse cap is recommended to be a minimum of 1.5 mm.

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Revised: 03/03/17

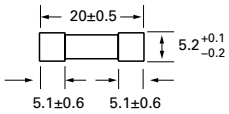
Axial Lead & Cartridge Fuses

5×20 mm > Time-Lag > 215 Series

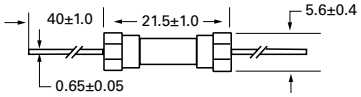
Dimensions

All dimensions in mm

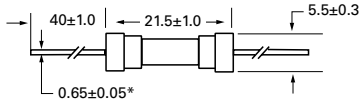
0215.125P
to
0215020P



0215.125XEP
to
0215.800XEP



0215001.XEP
to
0215020.XEP



Notes:
* Ratings above 6.3 A have 0.8 ± 0.05 diameter lead;
* Ratings above 12 A have 1.2 ± 0.05 diameter lead.

Part Numbering System

0215 xxxx M X E/G P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000
H = 100

Packaging Code
X = Filler

Option Codes
Blank : Cartidge Type Fuse
E : Axial Lead Fuse
G : Color Coding

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
215 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	N/A	1000	MRET1	T1=53mm (2.087")
Bulk and Color Coding	N/A	1000	MXG	N/A
Bulk	N/A	1000	MXB	N/A
Bulk	N/A	100	HX	N/A

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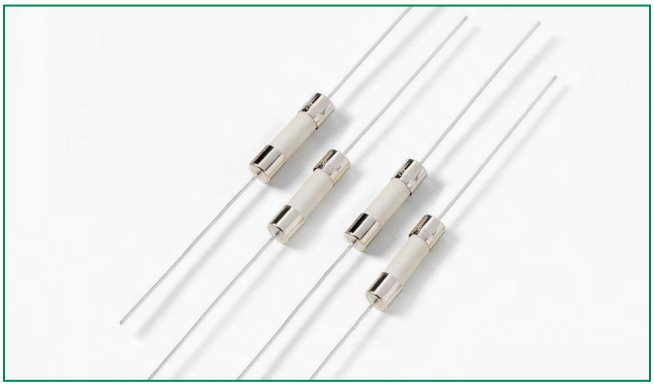
215SP Series, 5×20 mm, Time-Lag Fuse



Description

5×20mm Time-Lag surge withstanding ceramic body cartridge fuse designed to IEC specification

Features

- Designed to International (IEC) Standards for use globally
- High breaking capacity
- RoHS compliant and lead-free
- Meets the IEC 60127-2, Sheet 5 specification for Time-Lag Fuses

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
PSE	NBK080205-E10480B NBK250702-E10480F	1A – 5A 6.3A – 10A
CQC	CQC10012041490	1A – 6.3A
KC	SU05001-2011B SU05001-10001 SU05001-10002 SU05001-2012B	1A – 2.5A 3.15A – 6.3A 8A 10A
UL	E10480	1A – 10A
CSA	29862	1A – 10A
VDE	40013521	1 – 10A
TÜV	J50248091	10A
CE	N/A	1A – 10A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
210%	1A - 3.15A	30 minutes, Maximum
	4A - 6.3A	30 minutes, Maximum
	8A - 10A	30 minutes, Maximum
275%	1A - 3.15A	.75 sec. Min.; 80 secs. Max.
	4A - 6.3A	.75 sec. Min.; 80 secs. Max.
	8A - 10A	.75 sec. Min.; 80 secs. Max.
400%	1A - 3.15A	.095 sec. Min.; 5 secs. Max.
	4A - 6.3A	.150 sec. Min.; 5 secs. Max.
	8A - 10A	.150 sec. Min.; 5 secs. Max.
1000%	1A - 3.15A	.010 sec. Min.; .150 secs. Max.
	4A - 6.3A	.010 sec. Min.; .150 secs. Max.
	8A - 10A	.010 sec. Min.; .150 secs. Max.

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating	Voltage Rating	Interrupting Rating	Nominal Resistance Cold Ohms (Ohms)	Nominal Melting I^2t (A^2 sec)	Maximum Voltage Drop at Rated Current (mV)	Maximum Power Dissapation at 1.5In (W)	Agency Approvals							
								PSE	CQC	KC	UL	CSA	VDE	TÜV	CE
001	1	250	1500 A @ 250 VAC	0.1515	1.52000	350	2.5	x	x	x	x	x	x		x
1.25	1.25	250		0.1074	3.20000	300	2.5	x	x	x	x	x	x		x
01.6	1.6	250		0.0707	6.83000	200	2.5	x	x	x	x	x	x		x
002	2	250		0.0566	11.68000	190	2.5	x	x	x	x	x	x		x
02.5	2.5	250		0.0386	22.29000	180	2.5	x	x	x	x	x	x		x
3.15	3.15	250		0.0283	43.25500	140	4	x	x	x	x	x	x		x
004	4	250		0.0185	46.96000	100	4	x	x	x	x	x	x		x
005	5	250		0.0153	66.09500	100	4	x	x	x	x	x	x		x
06.3	6.3	250		0.0108	128.75000	100	4	x	x	x	x	x	x		x
008	8	250		0.0092	209.88000	100	4	x		x	x	x	x		x
010	10	250		0.0066	333.56500	100	4	x		x	x	x	x	x	x

I^2t test at 10x rated current

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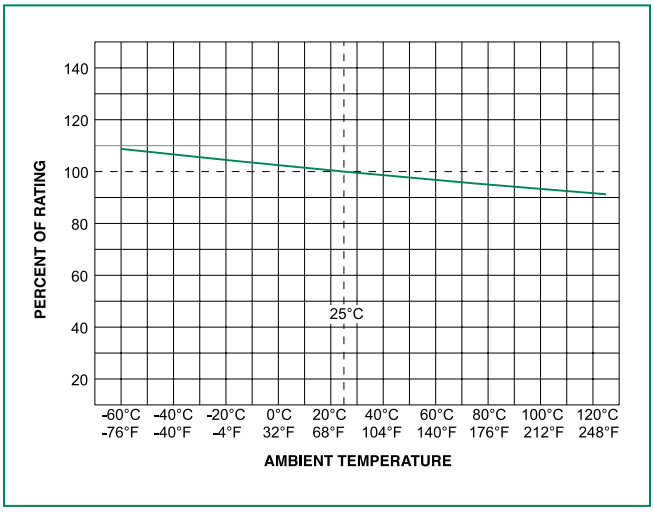
Axial Lead & Cartridge Fuses

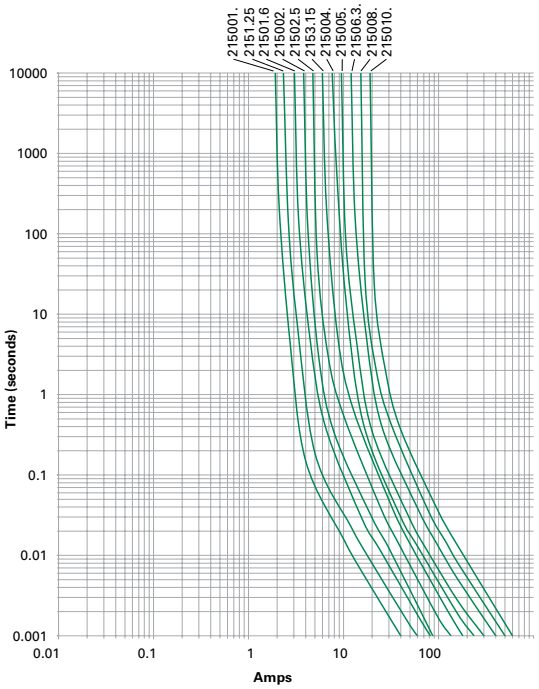
5×20 mm > Time-Lag Fuse > 215SP Series

Temperature Re-rating Curve

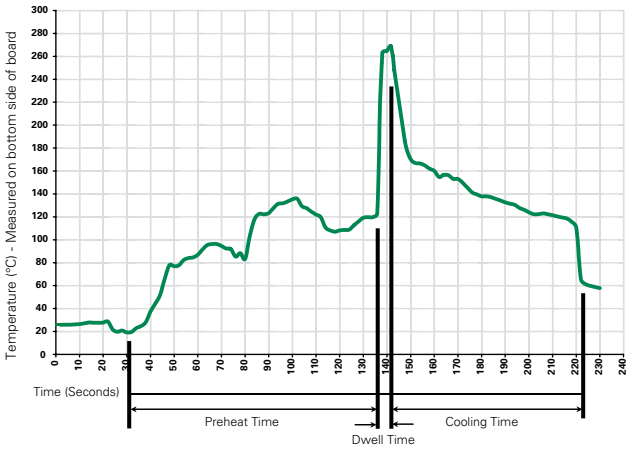


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

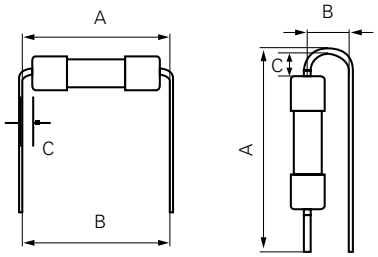
Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Different values of A and B available, please contact the Littelfuse sales representative in your region:



For the pigtailed fuse, please follow the recommendations below for axial lead forming and mounting into PCB:

Lead forming:

The distance C between cap flat surface and axial lead shall be greater than 1.0 mm.

PCB mounting:

The distance between PCB and fuse cap is recommended to be a minimum of 1.5 mm.

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Axial Lead & Cartridge Fuses

5×20 mm > Time-Lag Fuse > 215SP Series

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Product Characteristics

Materials	**Body:** Ceramic **Cap:** Nickel–plated Brass **Leads:** Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	**Cap 1:** Brand logo, current and voltage ratings **Cap 2:** Agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A (High RH (95%) and elevated temp (40°C) for 240 hours)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Part Numbering System

0215 xxxx M X E SP P

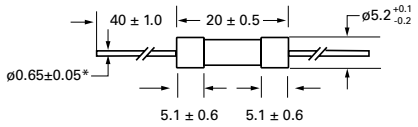
- **Series**
- **Current Rating Code** — Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code** — M = 1000
- **Packaging Code** — X = Filler
- **Option Codes** — Blank : Cartidge Type Fuse; E : Axial Leaded Fuse
- **Single-Cap Pigtail**
- **Lead-Free**

Packaging

Packaging Option	Packaging Specification	Quantity	Packaging Code	Reel Size
215SP Series				
Bulk	N/A	1000	MXE	N/A

Dimensions

All dimensions in mm



Notes:
* Ratings 8A and 10A have 0.8 ± 0.05 diameter lead.

Additional Information

Datasheet | **Resources** | **Samples**

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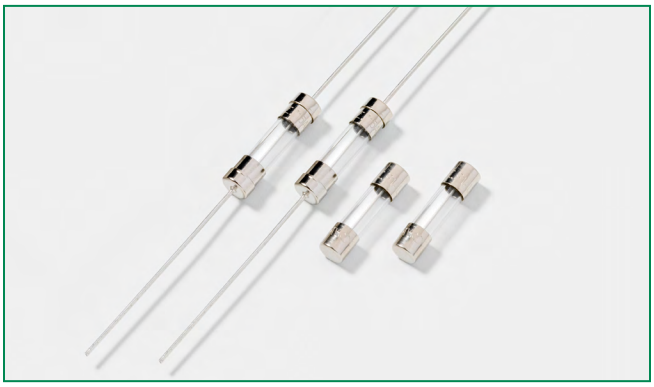
232 Series, 5×20 mm, Medium-Acting Fuse



Description

The 232 Series Fuse is a 5x20mm, medium-acting, glass body cartridge fuse. It is specifically designed to meet the requirements of Appendix 3 of METI/PSE.

Features

- Available in cartridge and axial lead format
- RoHS compliant and lead-free

Agency Approvals

Agency	Agency File Number	Ampere Range
PS E	Cartridge: NBK180509-JP1021 A/C NBK020609-JP1021 A/C Leaded: NBK180509-JP1021 B/D NBK020609-JP1021 B/D	 1A – 5A 6.3A – 10A 1A – 5A 6.3A – 10A
K	SU05001-2015	1A – 10A
CE	N/A	1A – 10A

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
130%	1 hour, Minimum
160%	1 hour, Maximum
200%	2 minutes, Maximum

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals		
						PS E	K	CE
001.	1	125/250	10 kA @ 125VAC	0.0923	1.37300	x	x	x
1.25	1.25	125/250		0.0685	4.11000	x	x	x
01.6	1.6	125/250		0.0537	6.96000	x	x	x
002.	2	125/250		0.0370	8.25000	x	x	x
02.5	2.5	125/250		0.0291	13.87500	x	x	x
003.	3	125/250		0.0226	17.19000	x	x	x
3.15	3.15	125/250		0.0215	21.9500	x	x	x
004.	4	125/250		0.0174	37.73000	x	x	x
005.	5	125/250		0.0134	56.72000	x	x	x
06.3	6.3	125/250	300A @ 125VAC	0.0102	151.54000	x	x	x
008.*	8	125/250		0.0076	182.58000	x	x	x
010.*	10	125/250		0.0059	290.66500	x	x	x

To order 125Vac rated, please add part no. suffix

* Interrupting Rating for 8A & 10A is 100A@250Vac

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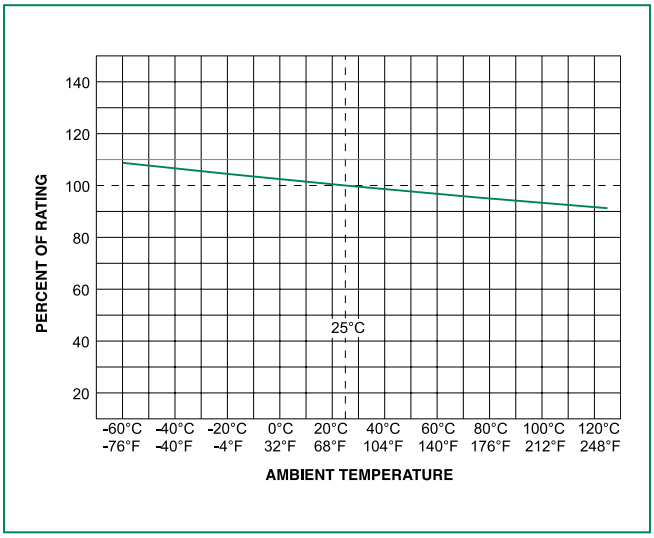
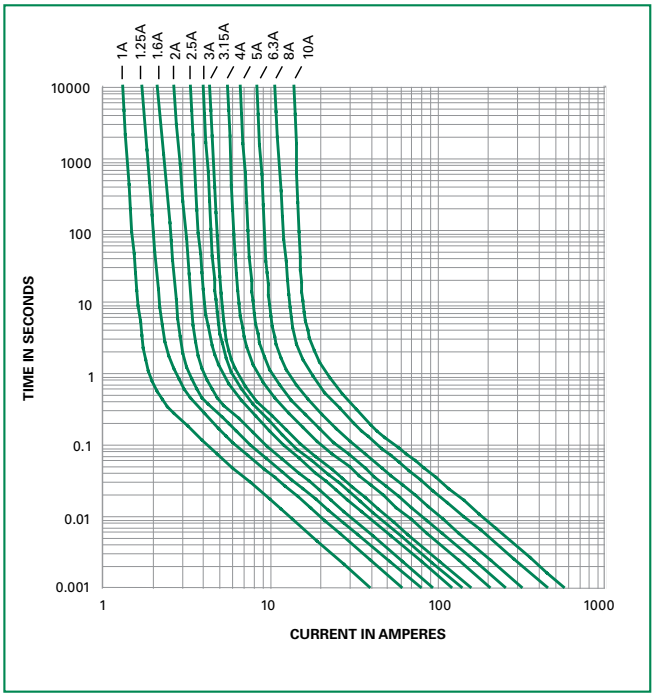
Temperature Re-rating Curve

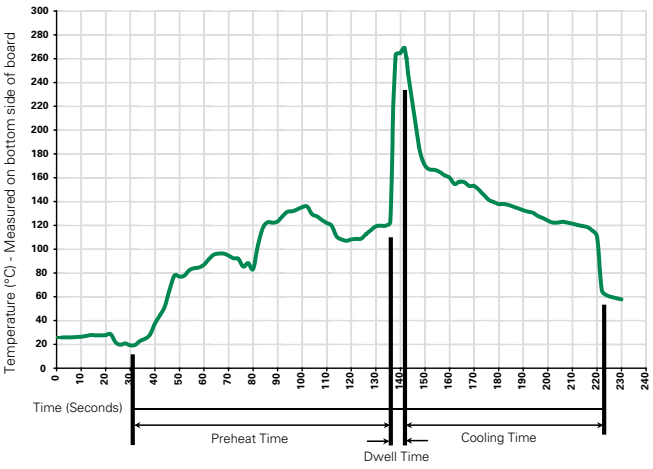


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
232 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A

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Axial Lead & Cartridge Fuses

5×20 mm > Medium-Acting > 232 Series

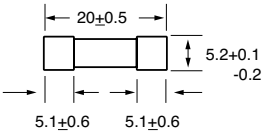
Product Characteristics

Materials	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211. Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap 1: Brand log, current and voltage ratings, and agency approval Cap 2: Blank
Packaging	Available in Bulk (M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

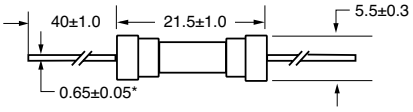
Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C + 125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A high RH (95%) and elevated temperature (40° C) for 240 hours.
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

0232 000P



0232 000 **XEP**



Notes:
* Ratings above 6.3A have 0.8±0.05 diameter lead.

All dimensions in mm

Part Numbering System

0232 xxxx M X 125 P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Under Option Code
125 = To order 125Vac rated fuse
Blank = 250Vac rated fuse

Lead-free

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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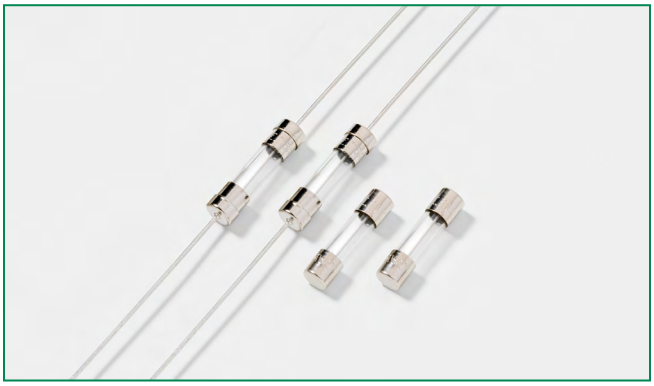
235 Series, 5×20 mm, Fast-Acting Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
PSE	Cartridge: NBK030609-JP1021A NBK190609-JP1021A NBK030609-JP1021B Leaded: NBK030609-JP1021C NBK190609-JP1021B NBK030609-JP1021D	 1-3.5A 4-5A 6-7A 1-3.5A 4-5A 6-7A
KC	SU05001 – 3007 SU05001 – 2002 SU05001 – 2003	0.100A – 0.400A 0.500A – 3A 4A – 6A
UL	E10480	0.100A - 7A
CSA	29862	0.100A – 3A 4A – 6A
CE	N/A	0.100A – 7A

Description

5×20mm fast-acting glass body cartridge fuse designed to UL specification.

Features

- Designed to UL/CSA/ANCE 248 Standard
- Available in cartridge and axial lead format
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.100A – 7A	4 hours, Minimum
135%		1 hour, Maximum
200%		5 seconds, Maximum

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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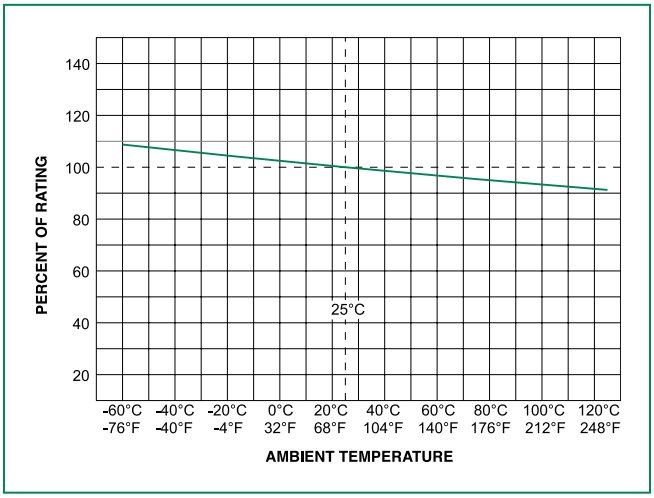
Axial Lead & Cartridge Fuses

5×20 mm > Fast-Acting > 235 Series

Electrical Characteristic Specifications by Item

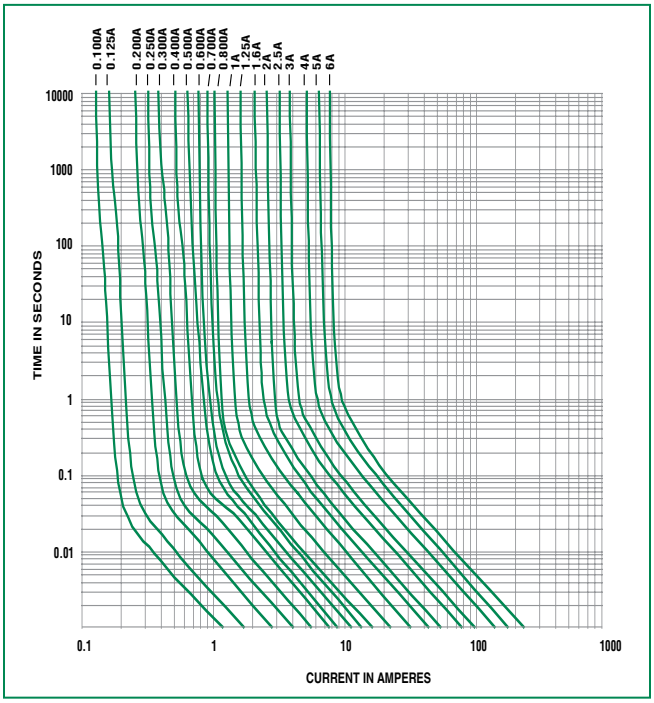
Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals				
						CE	UL	CSA	PSE	KC
.100	0.1	250	35A @ 250VAC 10kA @ 125VAC	8.4000	0.00127	x	x	x		x
.125	0.125	250		5.7500	0.00273	x	x	x		x
.200	0.2	250		3.1500	0.00867	x	x	x		x
.250	0.25	250		2.2500	0.01660	x	x	x		x
.300	0.3	250		1.6000	0.03215	x	x	x		x
.400	0.4	250		1.075	0.05845	x	x	x		x
.500	0.5	250		0.4265	0.06915	x	x	x		x
.600	0.6	250		0.3195	0.11200	x	x	x		x
.700	0.7	250		0.2625	0.15600	x	x	x		x
.800	0.8	250		0.1920	0.25300	x	x	x		x
001.	1	250	100A @ 250VAC 10kA @ 125VAC	0.1530	0.46750	x	x	x	x	x
1.25	1.25	250		0.1055	1.08500	x	x	x	x	x
01.6	1.6	250		0.0758	2.02500	x	x	x	x	x
002.	2	250		0.0603	2.64500	x	x	x	x	x
02.5	2.5	250		0.0437	5.44500	x	x	x	x	x
003.	3	250		0.0347	8.39500	x	x	x	x	x
03.5	3.5	250		0.0331	17.14000	x	x		x	
004.	4	125	10kA @ 125VAC	0.0246	17.14000	x	x	x	x	x
005.	5	125		0.0184	27.41000	x	x	x	x	x
006.	6	125		0.0148	47.32500	x	x	x	x	x
007.	7	125		0.0157	64.81500	x	x		x	

Temperature Re-rating Curve



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

Average Time Current Curves



Please contact Littelfuse for details on T-C curve for 7A rating

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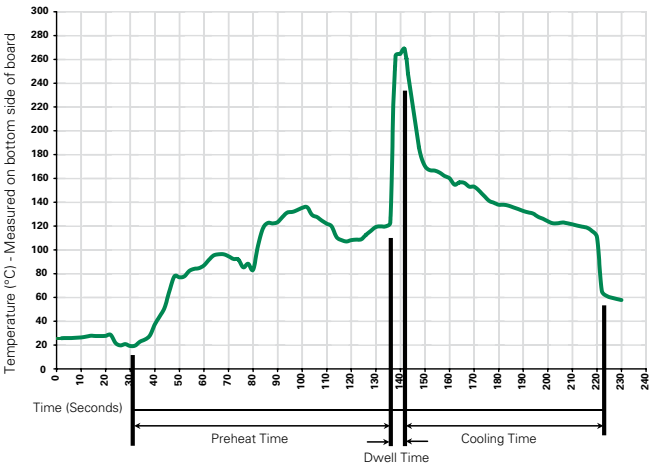
Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211 . Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap 1: Brand logo, current and voltage rating Cap 2: Series and agency approval markings
Packaging	Available in Bulk (M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C + 125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A high RH (95%) and elevated temperature (40° C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

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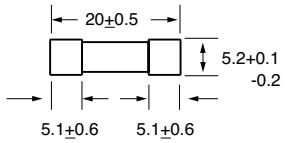
Revised: 03/03/17

Axial Lead & Cartridge Fuses

5×20 mm > Fast-Acting > 235 Series

Dimensions

0235000P



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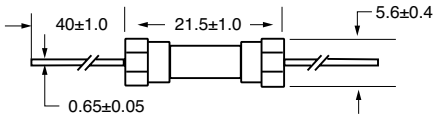
to
0235.400 XEP



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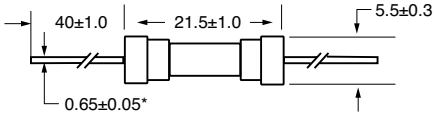
to
0235006.XEP



All dimensions in mm

Part Numbering System

0235 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Code
E = Axial Leaded

Lead-free

Notes:
* Ratings above 6.3A have 0.8±0.05 diameter lead.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
235 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1000	MRET1	T1=53mm (2.087")

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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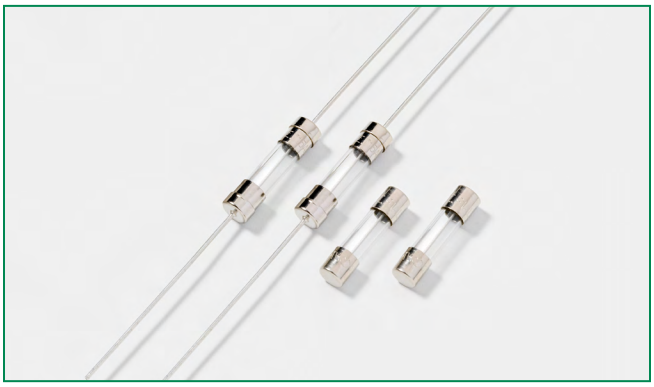
Revised: 03/03/17

233 Series, 5×20 mm, Medium-Acting Fuse



Description

5×20mm medium–acting glass body fuse designed to UL specification.

Features

- Designed to UL/CSA/ANCE 248-1 and 248-14 Standards
- Available in cartridge and axial lead format
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

Agency	Agency File Number	Ampere Range
PS E	Cartridge: NBK190609-JP1021A NBK030609-JP1021B Leaded: NBK190609-JP1021B NBK030609-JP1021D	1A – 5A 6A – 10A 1A – 5A 6A – 10A
CE	N/A	1A – 10A
UL	E10480	1A – 10A
KC	SU05001 - 2010	1A – 6.5A
CSA	29862	1A – 6A 8A – 10A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	1A – 3.5A	4 hours, Minimum
	4A – 7A	1 hour, Minimum
	8A – 10A	1 hour, Minimum
135%	1A – 3.5A	15 sec., Min; 1500 sec., Max.
	4A – 7A	15 sec., Min; 1500 sec., Max.
	8A – 10A	3 sec., Min; 3600 sec., Max.
200%	1A – 3.5A	.60 sec., Min; 3 sec., Max.
	4A – 7A	.60 sec., Min; 3 sec., Max.
	8A – 10A	0.4 sec., Min; 2.25 sec., Max.

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals				
						CE	UL	CSA	PS E	KC
001.	1	125	10 kA @ 125VAC	0.1750	1.97500	x	x	x	x	x
1.25	1.25	125		0.1263	3.39000	x	x	x	x	x
01.6	1.6	125		0.0880	6.14000	x	x	x	x	x
002.	2	125		0.0684	9.97000	x	x	x	x	x
02.5	2.5	125		0.0521	17.04500	x	x	x	x	x
003.	3	125		0.0431	26.24000	x	x	x	x	x
3.15	3.15	125		0.0380	29.79500	x	x	x	x	x
03.5	3.5	125		0.0322	36.27500	x	x	x	x	x
004.	4	125		0.0293	51.61000	x	x	x	x	x
005.	5	125		0.0217	89.97500	x	x	x	x	x
006.	6	125		0.0179	131.45500	x	x	x	x	x
06.3	6.3	125		0.0166	151.90500	x	x	x	x	x
007.	7	125		0.0137	157.31000	x	x		x	
008.	8	125		0.0084	169.43500	x	x	x	x	
010.	10	125		0.0066	274.11500	x	x	x	x	

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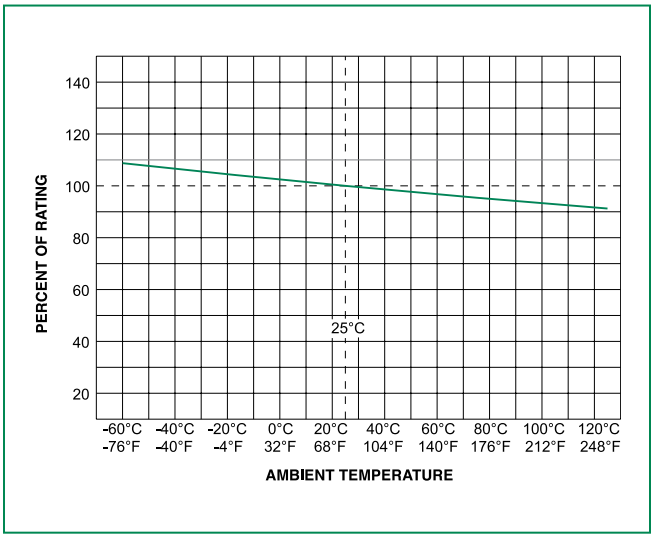
Axial Lead & Cartridge Fuses

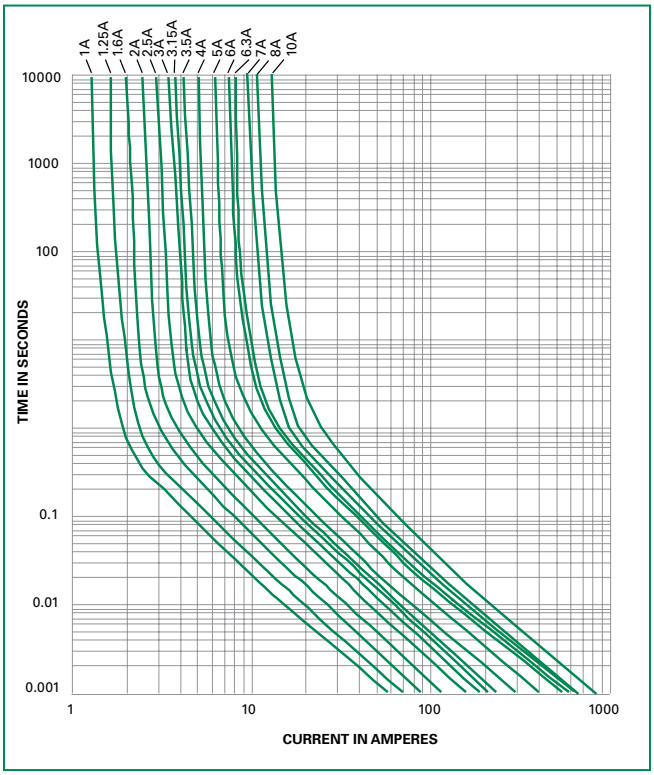
5×20 mm > Medium-Acting > 233 Series

Temperature Re-rating Curve

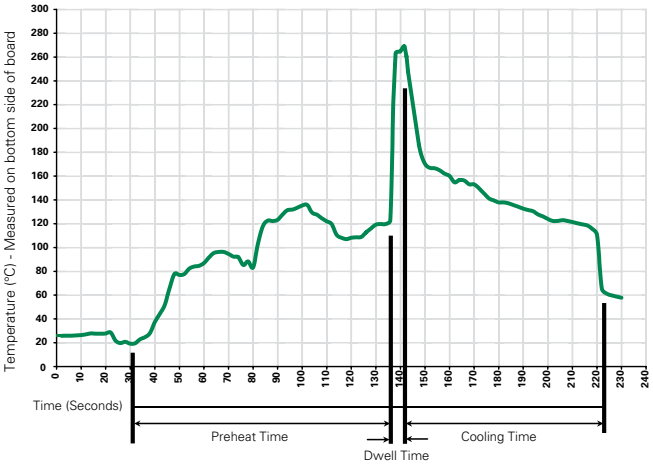


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
233 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1000	MRET1	T1=53mm (2.087")
Bulk	N/A	1000	MXB	N/A

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Axial Lead & Cartridge Fuses

5×20 mm > Medium-Acting > 233 Series

Littelfuse
Expertise Applied | Answers Delivered

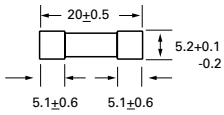
Product Characteristics

Materials	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap 1: Brand logo, current and voltage rating Cap 2: Series and agency approval markings
Packaging	Available in Bulk (M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

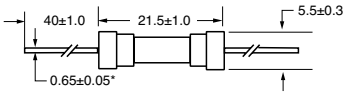
Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A. high RH (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

0233 000P



0233000XEP



All dimensions in mm

Notes: * Ratings above 6.3A have 0.8±0.05 diameter lead.

Part Numbering System

0233 xxxx M X P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Lead-free

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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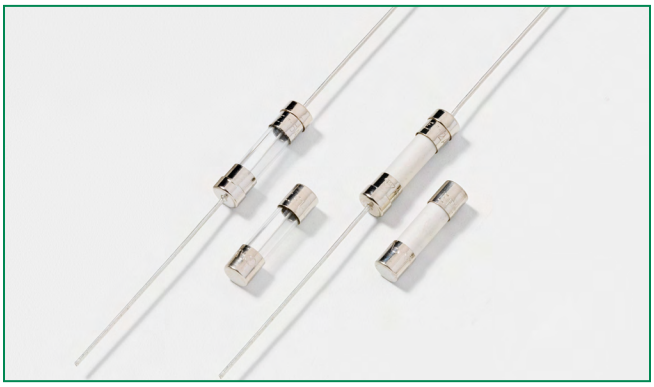
234 Series, 5×20 mm, Medium-Acting Fuse



Description

5×20mm medium-acting glass/ceramic body cartridge fuse designed to UL specification.

Features

- Designed to UL/CSA/ANCE 248-1 and 248-14 Standards
- Available in cartridge and axial lead format
- Glass body for 1-3.5A, Ceramic body for 4-10A
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

Agency	Agency File Number	Ampere Range
PSE	Cartridge: NBK040609-JP1021A NBK040609-JP1021C Leaded: NBK040609-JP1021B NBK040609-JP1021D	 1A - 5A 6A - 10A 1A - 5A 6A - 10A
CE	N/A	1A - 10A
KC	SU05001-3001 SU05001-4001 SU05001-2016	1A - 3.15A 3.5A 4A - 10A
UL	E10480	1A - 10A
CSA	29862	1A - 10A

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	1 – 3.5	4 hours, Minimum
	4 – 10	1 hour, Minimum
135%	1 – 3.5	3 sec., Min; 1 hr. Max
	4 – 10	3 sec., Min; 1 hr. Max
200%	1 – 3.5	400ms., Min; 2.25 sec. Max
	4 – 10	400ms., Min; 4 sec. Max

Electrical Characteristic Specification by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals				
						CE	UL	CSA	KC	PSE
001.	1	250	100A @ 250 VAC 10000A @ 125 VAC	0.1750	1.97500	x	x	x	x	x
1.25	1.25	250		0.1262	2.06000	x	x	x	x	x
01.6	1.6	250		0.0884	6.14000	x	x	x	x	x
002.	2	250		0.0684	9.97000	x	x	x	x	x
02.5	2.5	250		0.0521	17.04500	x	x	x	x	x
003.	3	250		0.0431	26.2400	x	x	x	x	x
3.15	3.15	250		0.0380	29.79500	x	x	x	x	x
03.5	3.5	250		0.0322	36.27500	x	x	x	x	x
004.	4	250	200A @ 250 VAC 10000A @ 125 VAC	0.0304	10.37000	x	x	x	x	x
005.	5	250		0.0214	20.64500	x	x	x	x	x
006.	6	250		0.0194	33.01500	x	x	x	x	x
06.3	6.3	250		0.0168	37.68500	x	x	x	x	x
008.	8	250		0.0144	80.67500	x	x	x	x	x
010.	10	250		0.0107	51.40000	x	x	x	x	x

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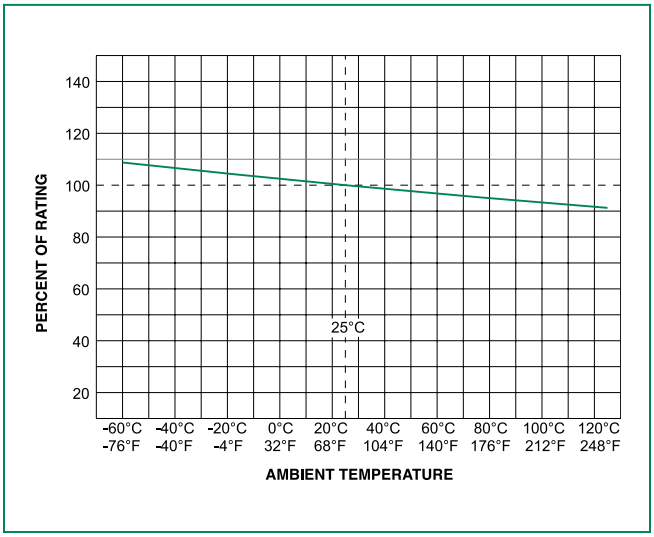
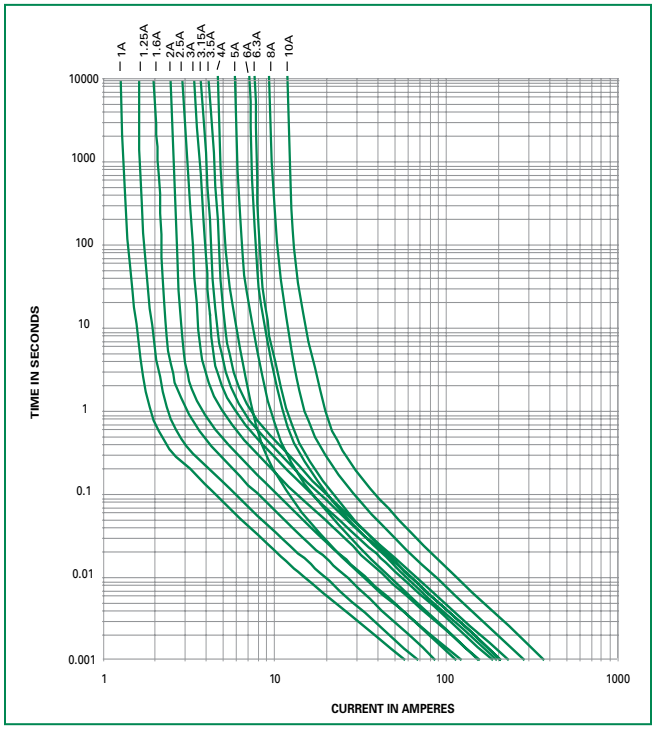
Temperature Re-rating Curve

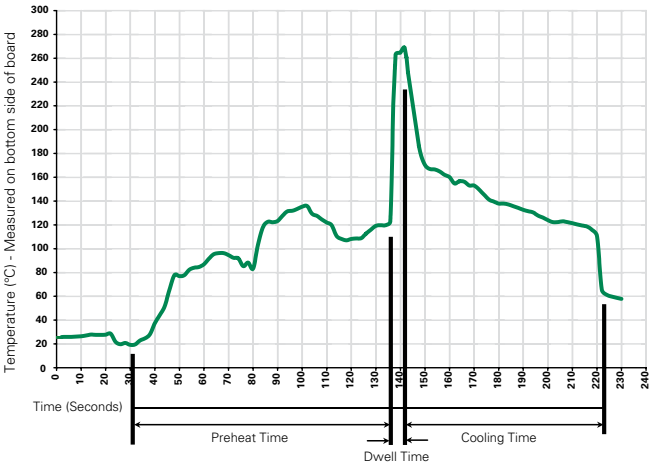


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
234 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1000	MRET1	T1=53mm (2.087")

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

5×20 mm > Medium-Acting > 234 Series

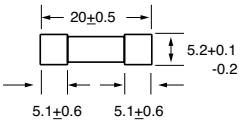
Product Characteristics

Materials	Body: Glass(1A-3.5A), Ceramic(4A-10A) Cap: Nickel–plated brass Leads: Tin–plated Copper Filter: Sand (4A – 10A)
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap 1: Brand logo, current and voltage rating Cap 2: Series and agency approval markings
Packaging	Available in Bulk (V=5, H=100, M=1000 pcs/pkg) or on Tape/Reel (MRET1=1000 pcs/reel)

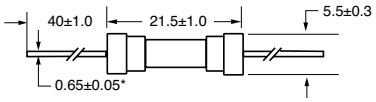
Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202 Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A. high RH (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

0234 000P



0234 000**XEP**



All dimensions in mm

Notes:
* Ratings above 6.3A have 0.8±0.05 diameter lead.

Part Numbering System

0234 xxxx M X P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Lead-free

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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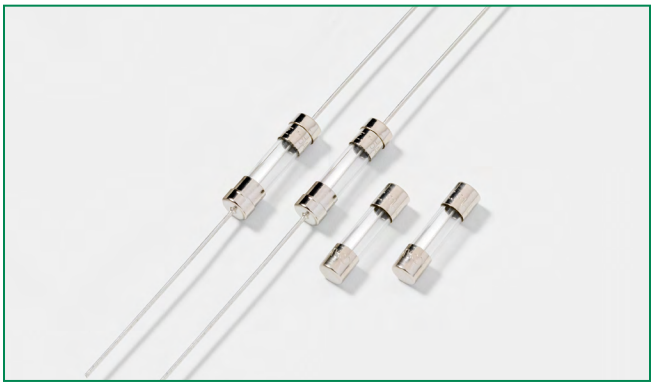
Revised: 03/03/17

239 Series, 5×20 mm, Slo-Blo® Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
PSE	Cartridge: NBK030609-JP1021A NBK190609-JP1021A NBK030609-JP1021B Leaded: NBK030609-JP1021C NBK190609-JP1021B NBK030609-JP1021D	 1A – 3.5A 4A – 5A 7A 1A – 3.5A 4A – 5A 7A
KC	SU05001 – 2004A SU05001 – 2014A	0.200A – 3.15A 4A – 7A
UL	E10480	0.080A – 7A
CSA	29862	0.200A – 3.15A 4A – 7A
CE	N/A	0.080A – 7A

Description

5×20mm Slo-Blo® glass body cartridge fuse designed to UL specification.

Features

- Designed to UL/CSA/ANCE 248-1 and 248-14 Standards
- Available in cartridge and axial lead format
- RoHS compliant and lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Ratings	Opening Time
100%	All Ratings	4 hours, Minimum
135%		1 hour, Maximum
200%		2 minutes, Maximum

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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Specifications are subject to change without notice. Application testing is strongly recommended.

Revised: 03/03/17

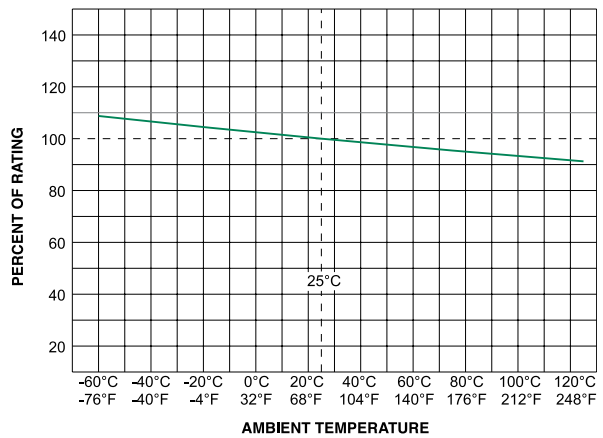
Axial Lead & Cartridge Fuses

5×20 mm > Slo-Blo® Fuse > 239 Series

Electrical Characteristic Specification by Item

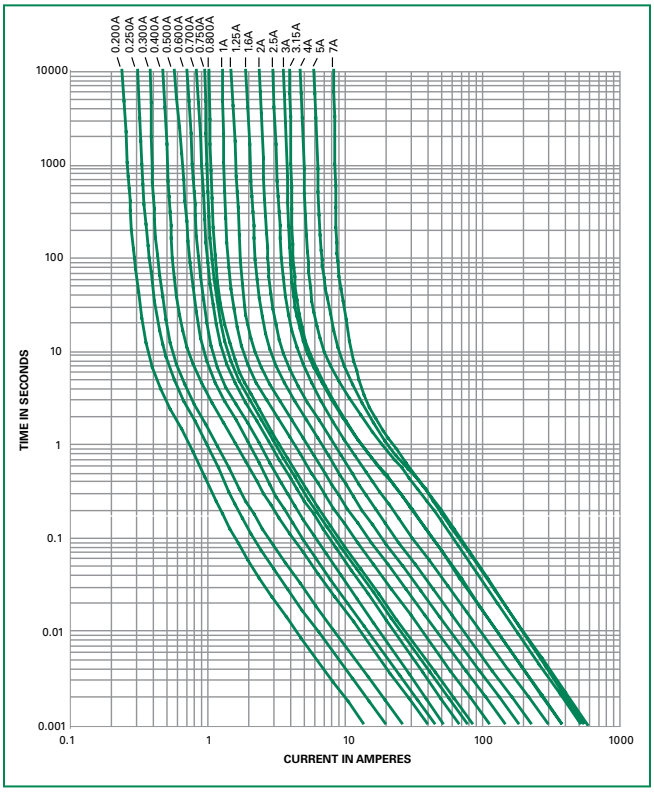
Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals				
						UL	CSA	PSE	KC	CE
.080	0.08	250	35A @ 250 VAC 10kA @ 125 VAC	28.1750	0.02500	x				x
.100	0.1	250		17.3425	0.05500	x				x
.125	0.125	250		11.6000	0.08500	x				x
.150	0.15	250		8.1000	0.13000	x				x
.200	0.2	250		3.8725	0.16500	x	x		x	x
.250	0.25	250		3.0700	0.34000	x	x		x	x
.300	0.3	250		2.3000	0.61500	x	x		x	x
.400	0.4	250		1.4750	2.02000	x	x		x	x
.500	0.5	250		0.9090	1.98500	x	x		x	x
.600	0.6	250		0.6990	2.41500	x	x		x	x
.700	0.7	250		0.5375	4.12000	x	x		x	x
.750	0.75	250		0.4710	5.42500	x	x		x	x
.800	0.8	250		0.4155	7.56500	x	x		x	x
001.	1	250		0.2965	11.29500	x	x	x	x	x
1.25	1.25	250	10kA @ 125 VAC 100A @ 250 VAC	0.1980	19.52500	x	x	x	x	x
01.6	1.6	250		0.1205	30.43000	x	x	x	x	x
002.	2	250		0.0943	50.58500	x	x	x	x	x
02.5	2.5	250		0.0583	79.70500	x	x	x	x	x
003.	3	250		0.04877	129.51000	x	x	x	x	x
3.15	3.15	250		0.0414	128.05000	x	x	x	x	x
03.2	3.2	250		0.0385	128.05000	x		x		x
03.5	3.5	250		0.0370	128.05000	x		x		x
004.	4	125	10kA @ 125 VAC	0.0312	270.703	x	x	x	x	x
005.	5	125		0.0199	302.836	x	x	x	x	x
007.	7	125		0.0114	305.758	x	x	x	x	x

Temperature Re-rating Curve



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

Average Time Current Curves



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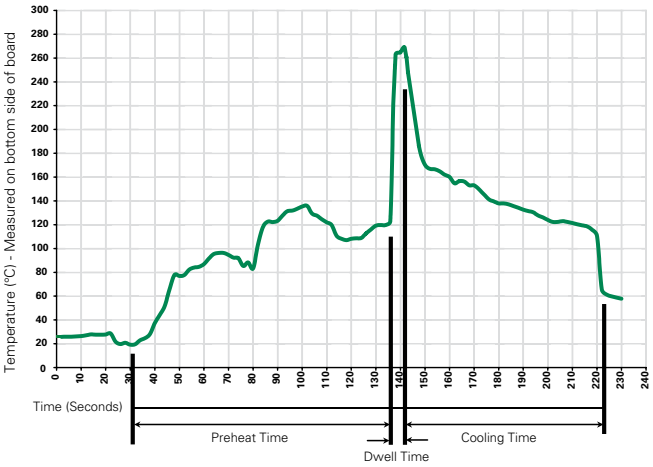
Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap 1: Brand logo, current and voltage rating Cap 2: Series and agency approval markings

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A. high RH (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

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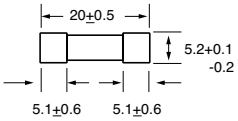
Axial Lead & Cartridge Fuses

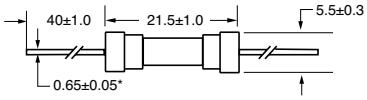
5×20 mm > Slo-Blo® Fuse > 239 Series

Dimensions

0239 000P



0239 000**XEP**



All dimensions in mm

Notes:
* Ratings above 6.3A have 0.8±0.05 diameter lead.

Part Numbering System

0239 xxxx M X P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
239 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	EIA 296-E	1000	MRET1	T1=52mm (2.062")
Bulk	N/A	1000	MXB	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	100	HXE	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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Littelfuse
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285 Series, 5×20 mm, Audio & Medical Fuse

Agency Approvals

Agency	Agency File Number	Ampere Range
PS E	NBK080205-E10480A NBK250702-E10480E NBK100408-JP1021A	1A – 5A 6.3A & 15A 20A

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Description

5×20mm fuse with gold or rhodium-plated caps and colourful ceramic body. Designed to IEC Cartridge Fuse standard.

Features

- Desiged to International (IEC) Standard for use globally. Meets the IEC 60127-2, Sheet 5 specification for time-lag fuses
- Available in Cartridge form
- RoHS compliant and lead-free
- Low magnetic susceptibility

Applications

Ideal for supplementary protection in appliances or utilization equipment, especially in audio and medical equipment.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	0.125A - 0.5A	60 minutes, Minimum
	1A - 3.15A	60 minutes, Minimum
	5A - 6.3A	60 minutes, Minimum
	8A - 20A	30 minutes, Minimum
210%	0.125A - 0.5A	30 minutes, Maximum
	1A - 3.15A	30 minutes, Maximum
	5A - 6.3A	30 minutes, Maximum
	8A - 20A	30 minutes, Maximum
275%	0.125A - 0.5A	250 ms. Min.; 80 sec. Max.
	1A - 3.15A	750 ms. Min.; 80 sec. Max.
	5A - 6.3A	750 ms. Min.; 80 sec. Max.
	8A - 20A	750 ms. Min.; 80 sec. Max.
400%	0.125A - 0.5A	50 ms. Min.; 5 sec. Max.
	1A - 3.15A	95 ms. Min.; 5 sec. Max.
	5A - 6.3A	150 ms. Min.; 5 sec. Max.
	8A - 20A	150 ms. Min.; 5 sec. Max.
1000%	0.125A - 0.5A	50 ms. Min.; 150 ms. Max.
	1A - 3.15A	10 ms. Min.; 150 ms. Max.
	5A - 6.3A	10 ms. Min.; 150 ms. Max.
	8A - 20A	10 ms. Min.; 150 ms. Max.

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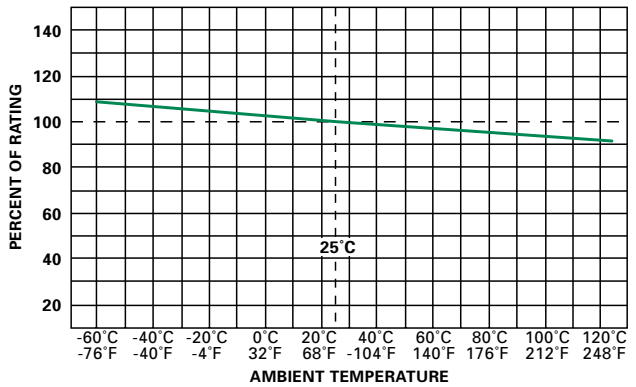
Axial Lead & Cartridge Fuses

5×20 mm > Audio & Medical > 285 Series

Electrical Characteristics Specification by Item

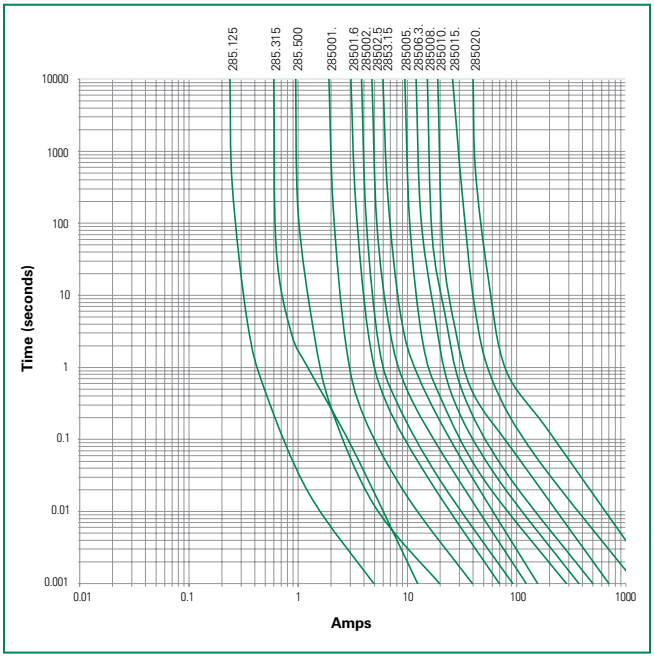
Amp Code	Amp Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 Sec.)	Nominal Voltage Drop at Rated Current (mV)	Nominal Power Dissipation at Rated Current (W)	Agency Approvals PS E
.125	0.125	250	1500A @ 250VAC	13.1240	0.028	2600	1.6	
.315	0.315	250		0.9275	0.625	1100	1.6	
.500	0.5	250		1.1215	0.3	850	1.6	
001	1	250		0.1455	1.6	350	2.5	x
01.6	1.6	250		0.0706	7.168	200	2.5	x
002	2	250		0.0546	10.8	190	2.5	x
02.5	2.5	250		0.0384	25.625	180	2.5	x
3.15	3.15	250		0.0269	51.597	140	4	x
005	5	250		0.0141	70	100	4	x
06.3	6.3	250		0.0107	130.977	100	4	x
008	8	250		0.0089	224	100	4	x
010	10	250		0.0065	361	100	4	x
015	15	250	500A @ 250VAC	0.0031	1305	100	4	x
020	20	250	400A @ 250VAC	0.0024	3225.6	100	4	x

Temperature Re-rating Curve



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

Average Time Current Curves



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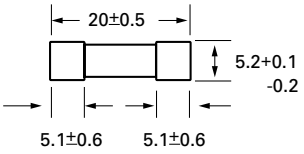
Product Characteristics

Materials	Body : Ceramic Cap : Gold / Rhodium-plated brass
Terminal Strength	MIL-STD-202, Method 211, Test condition A
Product Marking	Cap 1: Brand logo, current and voltage rating Cap 2: Agency approval markings

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test condition A: High RH (95%) and elevated temp. (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test condition B

Dimensions

0285.125 **XP/XRP**
to
0285020 **XP/XRP**



All dimensions in mm

Part Numbering System

0285 xxxx M X (R) P

- **Series**
- **Current Rating Code**
  Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code**
  M = 1000
  H = 100
- **Package Code**
  X = Filler
- **Option Codes**
  Blank = Gold-plated caps
  R = Rhodium-plated caps
- **Lead Free**

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
285 Series				
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	345_ISF	Panel Mount Shock-Safe Fuseholder	250	10
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options		20
	830	PC Mount Shock-Safe Miniature Fuseholder		16
Block	520	Metric OMNI-BLOK® Fuse Block		10
	646	PC Mount Miniature Fuse Block		6.3
	658	Surface Mount Miniature Fuse Block		10
Clip	520_W	PC Mount Miniature Fuse Clip		6.3
	111	PC Board Mount Fuse Clip		10
	445	PC Board Mount Fuse Clip		10

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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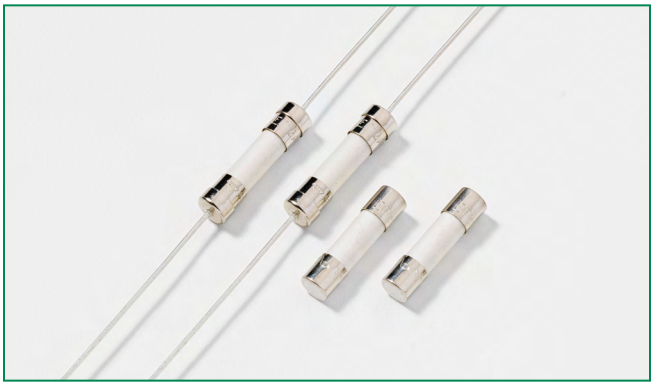
477 Series, 5×20 mm, Time-Lag Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
PSE	Cartridge: NBK040609-JP1021A NBK040609-JP1021C NBK100408-JP1021A Leaded: NBK040609-JP1021B NBK040609-JP1021D NBK100408-JP1021B	 1A – 5A 6.3A – 12A 16A 1A – 5A 6.3A – 12A 16A
S	1219190	0.500A – 8A
c UL us	E10480	0.5A – 5A(600VAC) 0.5A – 16A(400VDC) 6.3A – 16A(500VAC)
VDE	40025413	1A, 3.15A (500VAC) 1A, 3.15A (400VDC)
△	J50248089	10A/12A/16A
CE	N/A	0.500A – 16A

Additional Information

Datasheet | Resources | Samples

Description

400Vdc/500Vac rated, 5x20mm, time-lag, surge withstand ceramic body cartridge fuse.

Features

- Designed to International (IEC) Standard for use globally.
- Follow the IEC 60127-2, Sheet 5 specification for time-lag fuses
- Available in cartridge and axial lead form
- RoHS compliant and lead-free

Applications

High energy and power efficient applications.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	.5 - .8	60 minutes, Minimum
	1 - 3.15	60 minutes, Minimum
	4 - 6.3	60 minutes, Minimum
	8 - 16	30 minutes, Minimum
210%	.5 - .8	30 minutes, Maximum
	1 - 3.15	30 minutes, Maximum
	4 - 6.3	30 minutes, Maximum
	8 - 16	30 minutes, Maximum
275%	.5 - .8	.25 sec., Min.; 80 sec. Max.
	1 - 3.15	.75 sec., Min.; 80 sec. Max.
	4 - 6.3	.75 sec., Min.; 80 sec. Max.
	8 - 16	.75 sec., Min.; 80 sec. Max.
400%	.5 - .8	.05 sec., Min.; 5 sec. Max.
	1 - 3.15	.095 sec., Min.; 5 sec. Max.
	4 - 6.3	.15 sec., Min.; 5 sec. Max.
	8 - 16	.15 sec., Min.; 5 sec. Max.
1000%	.5 - .8	.005 sec., Min.; .15 sec. Max.
	1 - 3.15	.01 sec., Min.; .15 sec. Max.
	4 - 6.3	.01 sec., Min.; .15 sec. Max.
	8 - 16	.01 sec., Min.; .15 sec. Max.

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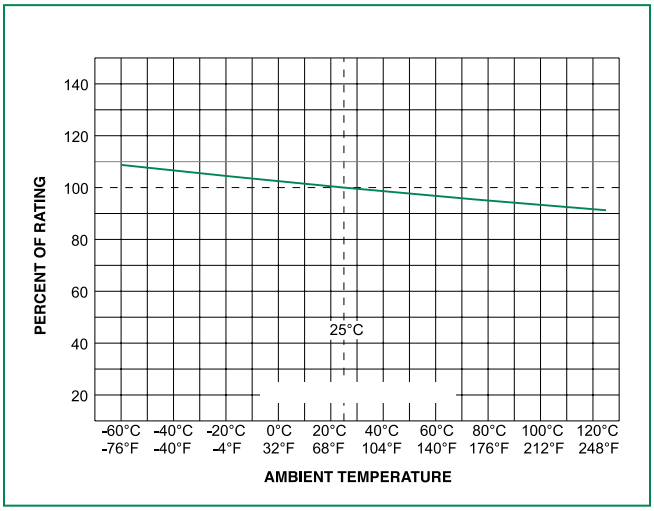
Electrical Characteristic

Amp Code	Amp Rating	Max Voltage Rating (V)		Interrupting Rating	Nominal Cold Resistance (Milli-ohms)	Nominal Melting I^2t (A^2 sec.)	Agency Approvals				
		AC	DC				PS E	c UL us			VDE
.500	0.5	500	400	100A@500VAC 1500A@400VDC	1055.900	0.300		x*	x**		
.800	0.8	500	400		430.000	0.909		x*	x**		
001.	1	500	400		139.400	1.800	x	x*	x**		x
002.	2	500	400		55.200	9.120	x	x*	x**		
3.15	3.15	500	400		27.700	50.109	x	x*	x**		x
004.	4	500	400	100A@500VAC 500A@400VDC	17.200	52.480	x	x*	x**		
005.	5	500	400		13.700	76.500	x	x*	x**		
06.3	6.3	500	400		10.970	121.451	x	x	x**		
008.	8	500	400		8.305	203.520	x	x	x**		
010.	10	500	400		4.950	509.000	x	x		x	
012.	12	500	400		4.730	576.000	x	x		x	
016.	16	500	400	100A@500VAC 400A@400VDC	3.100	1331.200	x	x		x***	

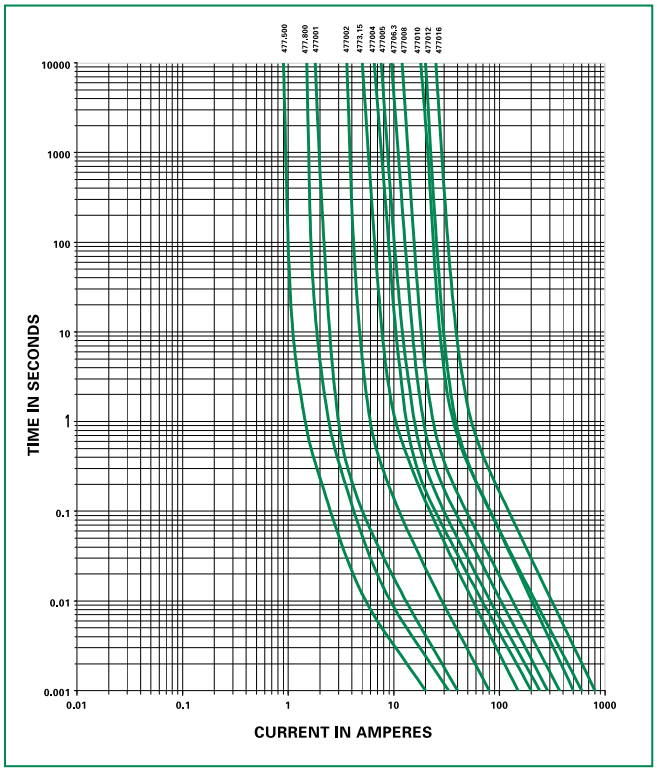
*100A @ 600Vac also available. Add suffix "MXE6P". Example: 0477004.MXE6P.
**Semko approval for 100A@500Vac and 200A@400Vdc.
I^2t test at 10x rated current.
***100A@ 500Vac and 300A@400Vdc for 16A

Temperature Re-rating Curve



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

Average Time Current Curves



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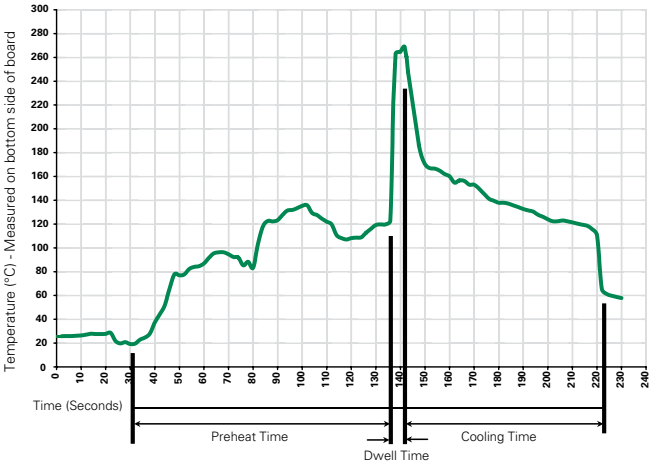
Axial Lead & Cartridge Fuses

5×20 mm > Time-Lag > 477 Series

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

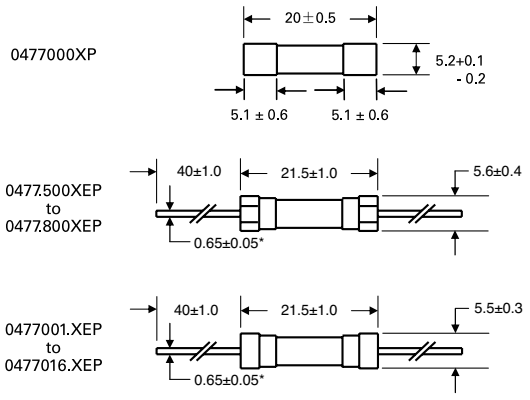
Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	**Body:** Ceramic **Cap:** Nickel–plated Brass **Leads:** Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	**Cap 1:** Brand logo, current and voltage ratings **Cap 2:** Series and agency approval markings
Packaging	Available in Bulk (M=1000 pcs/pkg)

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A (High RH (95%) and elevated temp (40°C) for 240 hours)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions



All dimensions in mm

Notes:
* Ratings above 5A 1.0±0.05 diameter lead.

Part Numbering System

0477 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Codes
E : Axial Lead
Others : special options.
Please call
Littelfuse for detail.

Lead-Free

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Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
477 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Reel and Tape	N/A	1000	MRET1	T1=53mm (2.087")

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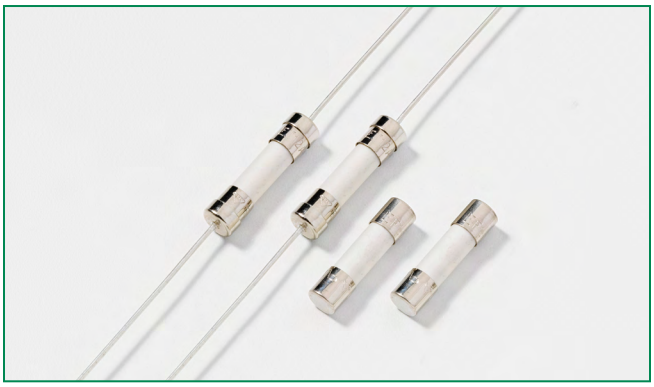
977 Series, 5×20mm, Time-Lag Fuse



Description

450Vdc/500Vac rated, 5×20mm, Time-Lag, surge withstand, ceramic body, cartridge fuse.

Features

- Designed to International (IEC) Standards for use globally
- Follow the IEC 60127-2, Sheet 5 specification for Time-Lag Fuses
- Available in Cartridge and Axial lead Form
- Rohs compliant and Pb-free

Agency Approvals

Agency	Agency File Number	Ampere Range
PS E	Cartridge: NBK040609-JP1021A NBK040609-JP1021C NBK100408-JP1021A Leaded: NBK040609-JP1021B NBK040609-JP1021D NBK100408-JP1021B	 2A – 5A 6.3A – 12A 16A 2A – 5A 6.3A – 12A 16A
S	1410854	0.5A-8A
CE	N/A	0.5A-8A

Applications

Inverter in LCD backlight unit, DC side of air-conditioners, 3-phase power supplies, Higher Energy and Power Efficient applications.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	0.5A – 8A	60 minutes, Minimum
	2A – 3.15A	60 minutes, Minimum
	4A – 6.3A	60 minutes, Minimum
	8A – 16A	30 minutes, Minimum
210%	0.5A – 8A	30 minutes, Maximum
	2A – 3.15A	30 minutes, Maximum
	4A – 6.3A	30 minutes, Maximum
	8A – 16A	30 minutes, Maximum
275%	0.5A – 8A	250 ms. Min.; 80 secs. Max.
	2A – 3.15A	750 ms. Min.; 80 secs. Max.
	4A – 6.3A	750 ms. Min.; 80 secs. Max.
	8A – 16A	750 ms. Min.; 80 secs. Max.
400%	0.5A – 8A	50 ms, Min.; 5 secs. Max.
	2A – 3.15A	95 ms, Min.; 5 secs. Max.
	4A – 6.3A	150 ms, Min.; 5 secs. Max.
	8A – 16A	150 ms, Min.; 5 secs. Max.
1000%	0.5A – 8A	5 ms, Min.; .150 ms, Max.
	2A – 3.15A	10 ms, Min.; .150 ms, Max.
	4A – 6.3A	10 ms, Min.; .150 ms, Max.
	8A – 16A	10 ms, Min.; .150 ms, Max.

Additional Information

Datasheet | Resources | Samples

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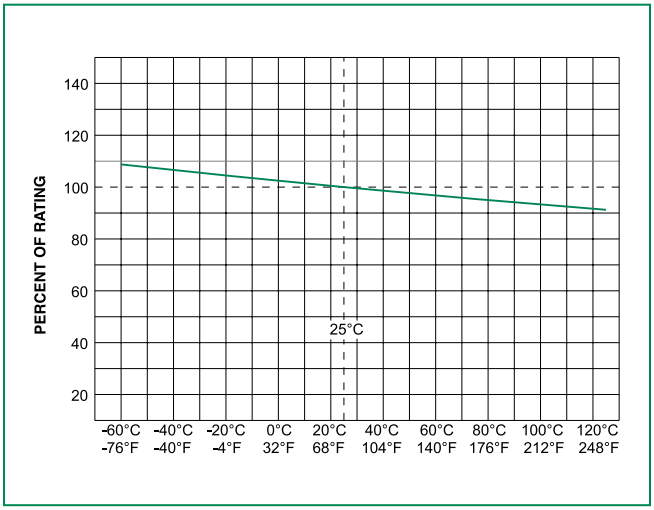
Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

Electrical Characteristic

Amp Code	Amp Rating	Voltage Rating		Interrupting Rating	Nominal Cold Resistance (milli-ohms)	Nominal Melting I^2t (A^2 sec.)	Agency Approvals	
		AC	DC				PS E	
.500	0.5	500	450	100A @ 500Vac 200A @ 450Vdc	945.0	0.3		x
.800	0.8	500	450		417.0	0.8		x
002.	2	500	450		44.5	17	x	x
3.15	3.15	500	450		27.5	58	x	x
004.	4	500	450		18.4	124	x	x
005.	5	500	450		11.9	91	x	x
06.3	6.3	500	450		9.1	188	x	x
008.	8	500	450		8.0	233	x	x
010.	10	500	450		7.2	249	x	
012.	12	500	450		5.8	388	x	
016.	16	500	450		3.9	725	x	

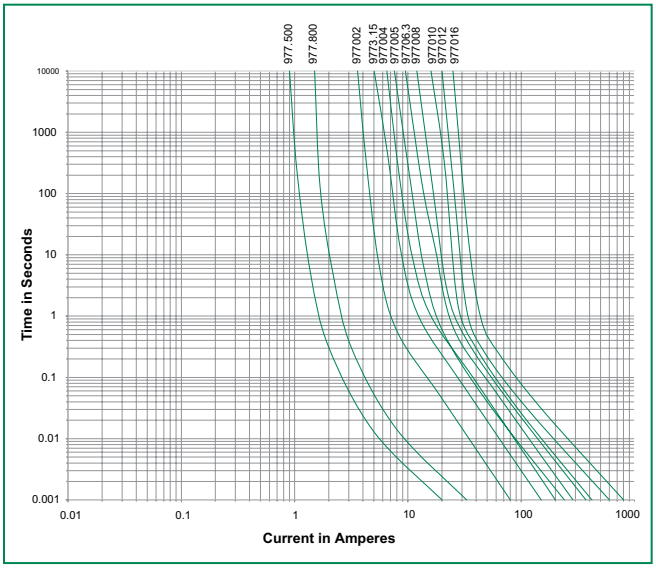
I^2t test at 10x rated current.

Temperature Re-rating Curve



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

Average Time Current Curves



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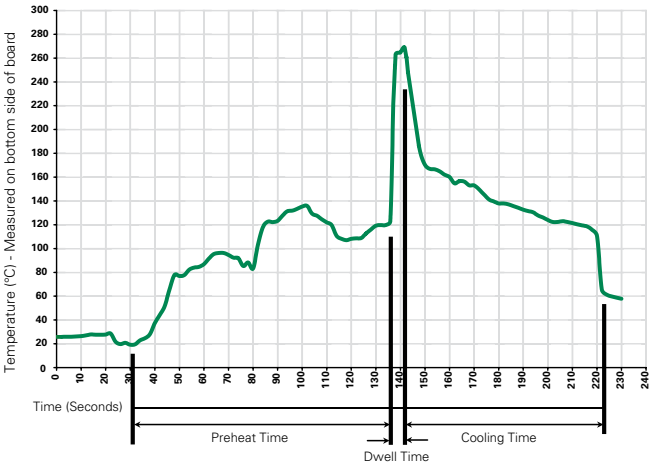
Revised: 03/03/17

Axial Lead & Cartridge Fuses

5×20mm > Time-Lag > 977 Series

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	**Body:** Ceramic **Cap:** Nickel–plated Brass **Leads:** Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	**Cap 1:** Brand logo, current and voltage ratings **Cap 2:** Series and agency approval markings

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A (High RH (95%) and elevated temp (40°C) for 240 hours)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

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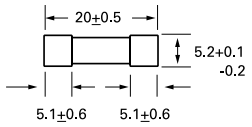
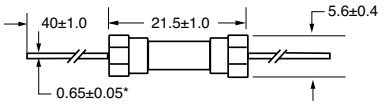
Dimensions

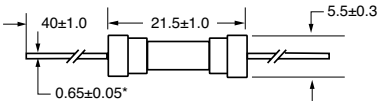
0977000.XP



0977.500XEP
to
0977.800XEP



0977002.XEP
to
0977016.XEP



All dimensions in mm

Notes:
* Ratings above 5A 1.0±0.05 diameter lead.
* For 977 16A 1.2±0.05 diameter lead.

Part Numbering System

0977 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Codes
E : Axial Leaded Fuse

P: Lead-free
Others : Special options.
Please call Littelfuse for detail.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
977 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A

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Revised: 03/03/17

312/318 Series Lead-Free 3AG, Fast-Acting Fuse

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	312 Series: 0.062A - 30A 318 Series: 0.062A - 10A
CSA	29862	312 Series: 0.062A - 30A 318 Series: 0.062A - 10A
PSE	NBK040205-E10480B/F NBK040205-E10480D/H	312/318 Series 1A-5A 312/318 Series 6A-10A
cULus	E10480	318 Series: 12A - 30A
KC	SU05001-6008 SU05001-5005 SU05001-5006	312/318 Series: 1-2A 312/318 Series: 3-6A 312/318 Series: 7-10A
CE	N/A	312 Series: 0.062A - 10A 318 Series: 0.062A - 10A

Description

The 3AG Fast-Acting Fuse solves a broad range of application requirements while offering reliable performance and cost-effective circuit protection.

Features

- In accordance with UL Standard 248-14
- Available in cartridge and axial lead format and with various forming dimensions
- RoHS compliant and Lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.062A – 35A	4 hours, Minimum
135%	0.062A – 35A	1 hour, Maximum
200%	0.062A – 10A	5 sec., Maximum
	12A – 30A	10 sec., Maximum
	35A	20 sec., Maximum

Additional Information

Datasheet 312 Series | **Resources 312 Series** | **Samples 312 Series** | **Accessories 312 & 318 Series**

Datasheet 318 Series | **Resources 318 Series** | **Samples 318 Series**

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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Revised: 03/03/17

Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals					
						UL	cULus	KC	PSE	SP	CE
.062	0.062	250	35A@250Vac 10KA@125Vac	24.7000	0.000249	x				x	x
.100	0.1	250		11.2800	0.00171	x				x	x
.125	0.125	250		7.1450	0.00289	x				x	x
.150	0.15	250		5.1300	0.00550	x				x	x
.175	0.175	250		3.8750	0.00960	x				x	x
.187	0.187	250		3.4200	0.0128	x				x	x
.200	0.2	250		3.0200	0.0165	x				x	x
.250	0.25	250		2.0100	0.0355	x				x	x
.300	0.3	250		1.4050	0.0689	x				x	x
.375	0.375	250		0.8250	0.185	x				x	x
.500	0.5	250		0.4980	0.483	x				x	x
.600	.6	250		0.3620	0.880	x				x	x
.750	0.75	250		0.2445	1.84	x				x	x
001.	1	250		0.1900	0.760	x		x	x	x	x
1.25	1.25	250	100A@250Vac 10KA@125Vac	0.1385	1.45	x		x	x	x	x
01.5	1.5	250		0.1036	2.35	x			x	x	x
01.6	1.6	250		0.0934	2.80	x		x	x	x	x
1.75	1.75	250		0.0856	3.60	x			x	x	x
01.8	1.8	250		0.0825	3.85	x			x	x	x
002.	2	250		0.0704	5.20	x		x	x	x	x
2.25	2.25	250		0.0594	7.20	x		x	x	x	x
02.5	2.5	250		0.0513	9.54	x		x	x	x	x
003.	3	250		0.0427	14.0	x		x	x	x	x
004.	4	250	200A@250Vac 10KA@125Vac	0.0293	28.5	x		x	x	x	x
005.	5	250		0.0224	50.0	x		x	x	x	x
006.	6	250		0.0178	118.0	x		x	x	x	x
007.	7	250		0.0146	81.0	x		x	x	x	x
008.	8	250		0.0122	166.0	x		x	x	x	x
010.	10	250		0.0093	298.0	x		x	x	x	x
012.*	12	32	300A@32 Vac	0.0072	234.6	x	x**			x	
015.*	15	32		0.0052	490.5	x	x**			x	
020.*	20	32		0.0035	1414	x	x**			x	
025.*	25	32		0.0024	2041	x	x**			x	
030.*	30	32		0.0019	3717	x	x**			x	
035.	35	32		0.0013	7531						

NOTES:

** For 318 Series 12A to 30A, the agency approval is only cURus.

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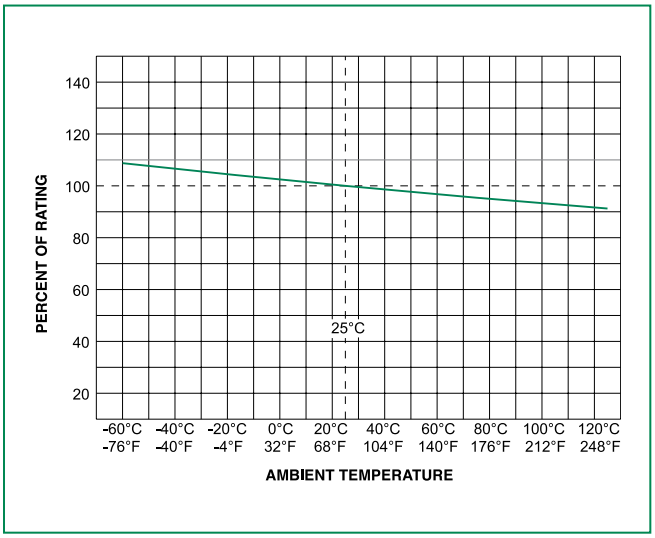
Axial Lead & Cartridge Fuses

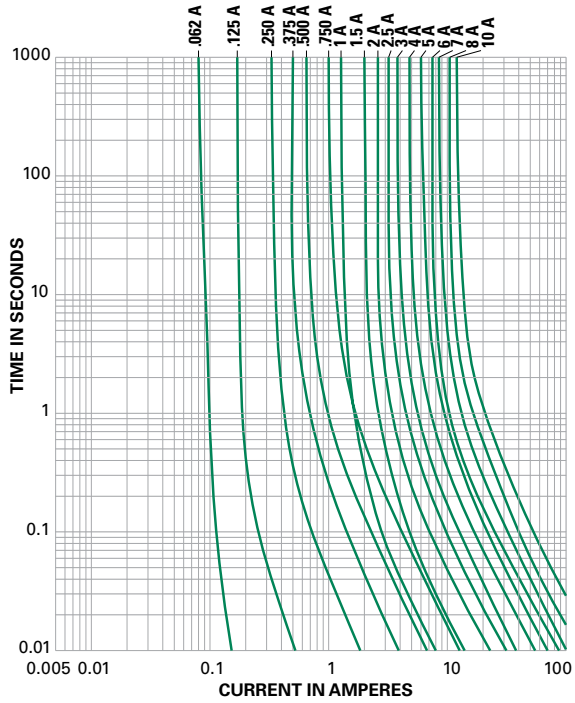
3AG > Fast Acting > 312/318 Series

Temperature Re-rating Curve



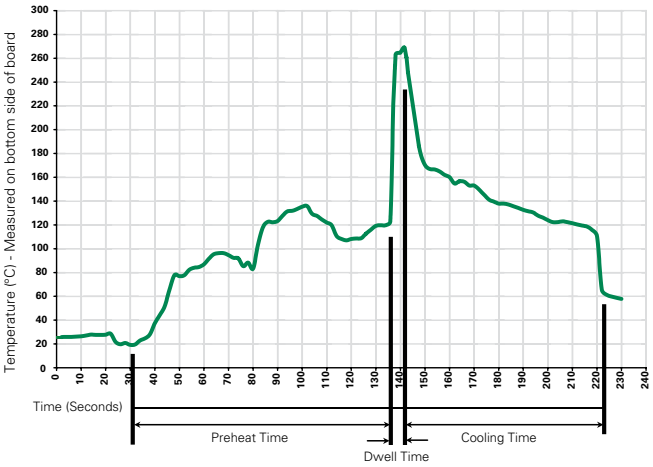
Note:
Rerating depicted in this curve is in addition to the industry practice derating of 25% for continuous operation.

Average Time Current Curves



Please contact Littelfuse for more details on those T-C Curves of other ampere ratings which are not published.

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Revised: 03/03/17

Product Characteristics

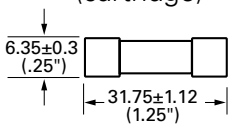
Materials	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%), and Elevated temperature (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

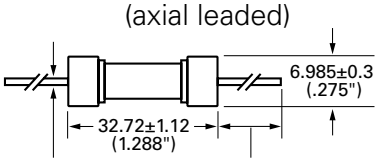
Dimensions

Measurements displayed in millimeters (inches)

312 000 **Series**
(cartridge)



318 000 **Series**
(axial leaded)

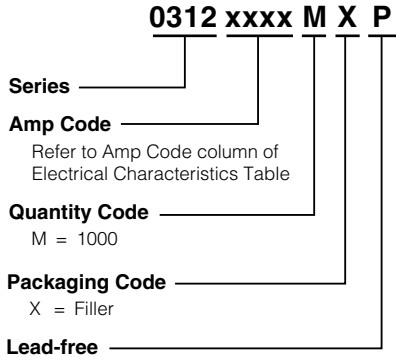


Axial Lead Diameter:
0.81±0.05 (.032")

Axial Lead Material:
Tin-coated copper

Axial Lead Length:
Standard Length:
39.68 (1.56") TYP.
Short Lead Option:
12.70 (0.50") TYP

Part Numbering System



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
312 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A
318 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MXB	N/A

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

3AG > Fast Acting > 312/318 Series

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	155100	Twist-Lock In-Line Fuseholder	32	20
	342	Traditional Panel Mount Fuseholder	250	20
	346	Panel Mount Flip-Top Shock-Safe Fuseholder	250	15
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options	250	20
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30
	101	Rivet/Eyelet Type Fuse Clip	1000	15

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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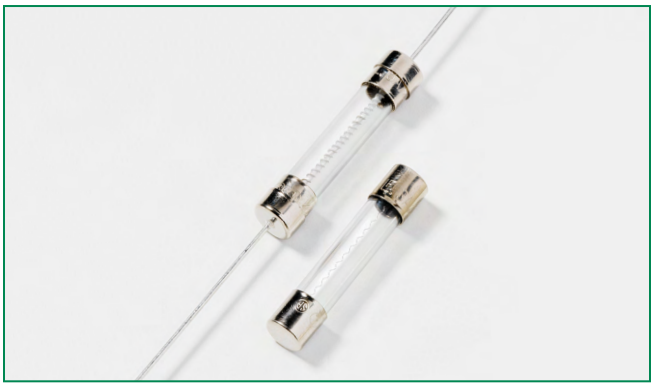
Revised: 03/03/17

313/315 Series Lead-Free 3AG, Slo-Blo® Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	0.010A - 10A**
CSA	29862	0.010A - 10A**/15A**
VDE	E10480	10A - 30A
PSE	NBK040205-E10480B/F NBK040205-E10480D/H	1-5A 6.25- 10A**/15A**
KC	SU05001-6004 SU05001-5007 SU05001-5008 SU05001-5009	2.25-2.5A 2.8A - 3.2A 4A - 6.3A 7A-8A
CE	N/A	0.010A - 10A**/15A**

** See note under Electrical Characteristics by item

Additional Information

Datasheet 313 Series

Resources 313 Series

Samples 313 Series

Accessories 313 & 315 Series

Datasheet 315 Series

Resources 315 Series

Samples 315 Series

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Description

The 3AG Slo-Blo® fuse solves a broad range of application requirements while offering reliable performance and cost-effective circuit protection.

The fuse catalog number with the suffix "ID" instantly identifies itself upon opening by showing a discoloration of its glass body. Guesswork and time consuming circuit testing are eliminated. This unique design offers the same quality performance characteristics as the standard 3AG Slo-Blo® Fuse design.

Features

- In accordance with UL Standard 248-14
- Available in cartridge and axial lead format and with various forming dimensions
- RoHS compliant and Lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics by Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	10mA – 30A	4 hours, Minimum
135%	10mA – 30A	1 hour, Maximum
200%	10mA – 15A	5 sec., Min., 30 sec., Max
	20A – 30A	5 sec., Min., 60 sec Max

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Revised: 03/03/17

Axial Lead & Cartridge Fuses

3AG > Slo-Blo® Fuse > 313/315 Series

Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals					
						UL	CSA	KC	VDE	PSE	CE
.010	0.01	250	35A@250Vac 10KA@125Vac	4300.0000	0.000121	x	x				x
.031	0.031	250		430.0000	0.00303	x	x				x
.040	0.04	250		300.0000	0.00630	x	x				x
.062	0.062	250		120.0000	0.0210	x	x				x
.100	0.1	250		43.0000	0.0850	x	x				x
.125	0.125	250		30.0000	0.152	x	x				x
.150	0.15	250		20.0000	0.270	x	x				x
.175	0.175	250		8.6700	0.177	x	x				x
.187	0.187	250		8.0100	0.230	x	x				x
.200	0.2	250		6.5900	0.270	x	x				x
.250	0.25	250		4.2700	0.385	x	x				x
.300	0.3	250		3.1350	0.730	x	x				x
.375	0.375	250		2.0950	1.23	x	x				x
.400	0.4	250		1.8750	1.35	x	x				x
.500*	0.5	250		1.2600	2.55	x	x				x
.600	0.6	250		0.9120	4.00	x	x				x
.700	0.7	250		0.7000	5.90	x	x				x
.750	0.75	250		0.6215	7.16	x	x				x
.800	0.8	250		0.5540	8.00	x	x				x
001.*	1	250		0.3750	14.0	x	x			x	x
01.2	1.2	250	100A@250Vac 10KA@125Vac	0.2780	21.5	x	x			x	x
1.25	1.25	250		0.2600	24.0	x	x			x	x
01.5*	1.5	250		0.1910	38.0	x	x			x	x
01.6	1.6	250		0.1710	49.6	x	x			x	x
01.8	1.8	250		0.1410	92.0	x	x			x	x
002.*	2	250		0.1169	77.0	x	x			x	x
2.25	2.25	250		0.0968	121	x	x	x		x	x
02.5	2.5	250		0.0811	199	x	x	x		x	x
02.8	2.8	250		0.0675	269	x	x	x		x	x
003.*	3	250		0.0593	200	x	x	x		x	x
03.2	3.2	250		0.0529	209	x	x	x		x	x
004.*	4	250	200A@250Vac 10KA@125Vac	0.0311	76.1	x	x	x		x	x
005.*	5	250		0.0214	276	x	x	x		x	x
6.25*	6.25	250		0.0154	388	x	x	x		x	x
06.3	6.3	250		0.0154	388	x	x	x		x	x
007.*	7	250		0.0128	547	x	x	x		x	x
008.*	8	250		0.0111	701	x	x	x		x	x
010.**	10	250		0.0083	1285	x	x			x	x
010.*	10	32	300A@32Vac	0.0083	1285				x		
012.	12	32		0.0065	1200				x		
015.**	15	125		0.0050	2650		x		x	x	x
015.	15	32		0.0050	2650				x		
020.	20	32		0.0022	9560				x		
025.	25	32		0.0017	16500				x		
030.	30	32		0.0012	26900				x		

* For 313series, these ratings available with an indicating option. Add the "ID" designation to the series number. i.e. 313.500ID.
** These 2 ratings are designed for special voltage requirement. For 10A, it is available as 250Vac rated and the part number is 0313010.MX250P; For 15A, it is available as 125Vac rated and the part number is 0315015.MX125P.

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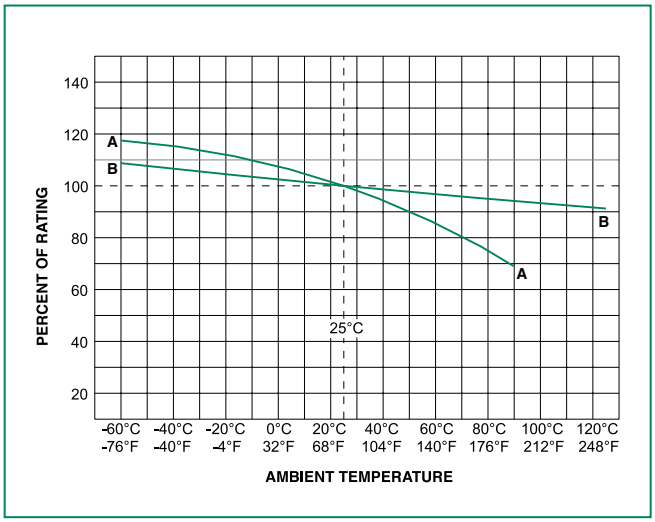
Temperature Re-rating Curve



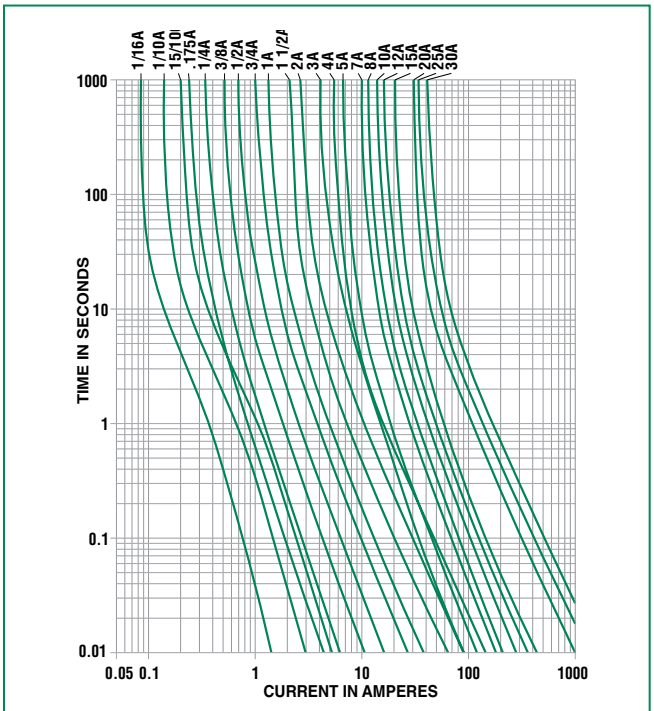
A - For 313/315 Series, from 10mA to 150mA

B - For all other ampere ratings of 313/315 series

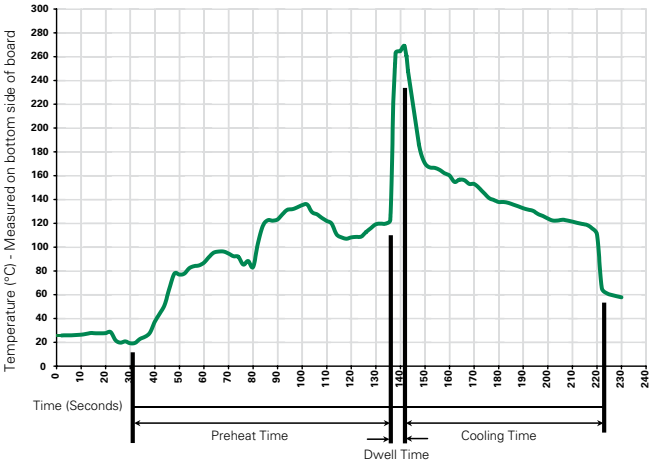
Note:

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

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
313 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A
315 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MXB	N/A

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Axial Lead & Cartridge Fuses

3AG > Slo-Blo® Fuse > 313/315 Series

Product Characteristics

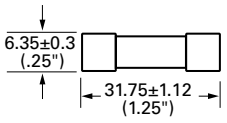
Materials	Body: Glass Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and Elevated temperature (40°C) for 240 hours
Salt Spray	MIL- STD-202, Method 101, Test Condition B

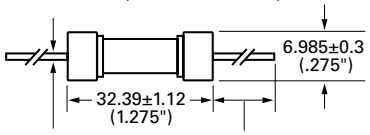
Dimensions

Measurements displayed in millimeters (inches)

313 000P **Series**
(cartridge)



315 000P **Series**
(axial leaded)



Axial Lead Diameter:
0.81±0.05 (.032") for (0.01A - 15A)
1.02±0.06 (.040") for (20A - 30A)

Axial Lead Length:
38.1±3.15 (1.50") TYP.

Axial Lead Material:
Tin-coated copper

Part Numbering System

0313 xxxx M X P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Lead-free

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	155100	Twist-Lock In-Line Fuseholder	32	20
	342	Traditional Panel Mount Fuseholder	250	20
	346	Panel Mount Flip-Top Shock-Safe Fuseholder	250	15
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options	250	16
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30
	101	Rivet/Eyelet Type Fuse Clip	1000	15

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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Axial Lead & Cartridge Fuses

3AB > Fast-Acting > 314/324 Series

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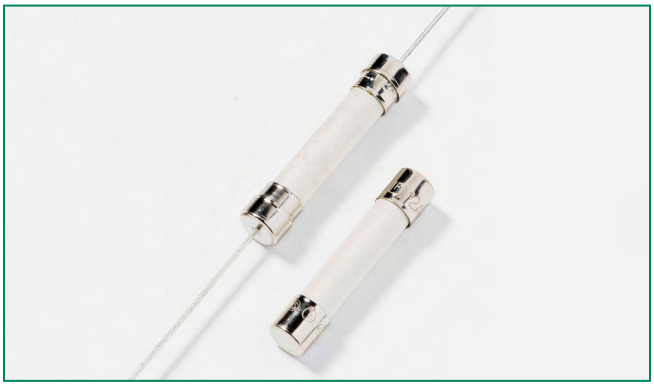
314/324 Series Lead-free 3AB, Fast-Acting Fuse



Description

The 3AB Fast-Acting Fuse with ceramic body construction permits higher interrupting ratings and voltage ratings. Ideal for applications where high current loads are expected.

Features

- In accordance with UL Standard 248-14
- Available in cartridge and axial lead format and with various forming dimensions
- RoHS compliant and Lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	0.375A - 15A
CSA	29862	0.375A - 20A
VDE	E10480	15A* - 40A
PSE	NBK030805-E10480A/B NBK030805-E10480C/D NBK030805-E10480E/F NBK260106-JP1021A/B	1-3.5A 4-5A 6-15A 20-30A
KC	SU05001-6003 SU05001-6001 SU05001-6006 SU05001-8002 SU05001-8003 SU05001-6002	3A 4-6A 7-10A 12-15A 20A 25-30A
CE	N/A	0.375A - 30A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	1/8 - 40	4 hours, Minimum
135%	1/8 - 30	1 hour, Maximum
200%	1/8 - 12	15 secs., Maximum
	15 - 30	30 secs., Maximum
250%	40	30 secs., Maximum

Electrical Specification by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals					
						UL	CSA	KC	VDE	PSE	CE
.375	0.375	250	35 A @ 250 VAC 10 kA @ 125 VAC 10 kA @ 125 VDC	0.820	0.210	x	x				x
.500	0.5	250		0.500	0.639	x	x				x
.750	0.75	250		0.250	2.061	x	x				x
001.	1	250	100 A @ 250 VAC 10 kA @ 125 VAC 10 kA @ 125 VDC	0.189	0.690	x	x			x	x
002.	2	250		0.0700	5.700	x	x			x	x
003.	3	250		0.0432	14.6	x	x	x		x	x
004.	4	250	750 A @ 250 VAC 10 kA @ 125 VAC 10 kA @ 125 VDC	0.0470	10.4	x	x	x		x	x
005.	5	250		0.0300	26.0	x	x	x		x	x
006.	6	250		0.0240	45.0	x	x	x		x	x
007.	7	250		0.0187	71.0	x	x	x		x	x
008.	8	250		0.0153	105	x	x	x		x	x
010.	10	250		0.0105	206	x	x	x		x	x
010.*	10	280		0.0105	206				x		x
012.	12	250		0.00760	570	x	x	x		x	x
015.	15	250		0.00505	292	x	x	x		x	x
015.*	15	280		0.00505	292				x		x
020.	20	250	1000 A @ 250 VAC 200 A @ 300 VAC 10 kA @ 125 VAC 10 kA @ 125 VDC	0.00355	631		x	x	x	x	x
020.*	20	280		0.00355	631				x		x
025.	25	250	100 A @ 250 VAC 1000A @ 75 VDC 400A @ 125 VAC 400 A @ 125 VDC	0.00235	1450			x	x	x	x
025.**	25	280		0.00235	1450				x		x
030.	30	250		0.00182	2490			x	x	x	x
040.	40	250	1000 A @ 250 VAC 400 A @ 150 VDC	0.0014	22925				x		x

* 350A@280VAC interrupting rating available for 10A, 15A and 20A. ** 50A@280VAC for 25A. Add suffix '280'. Example: 0324020.MX280P.
I^2t test at 10x rated current

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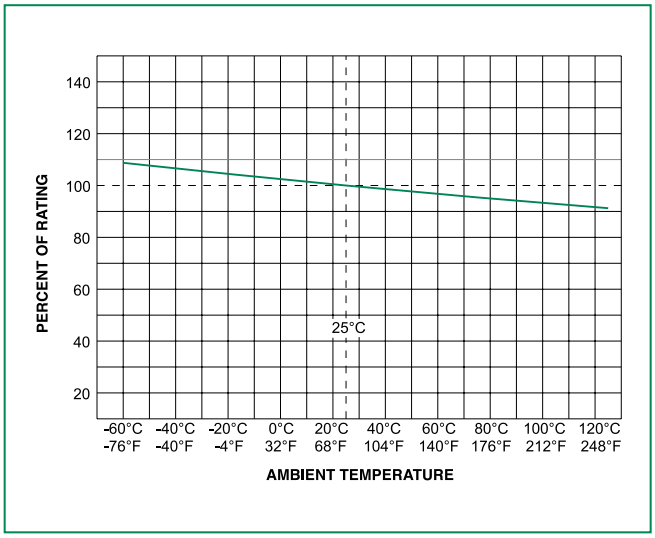
Axial Lead & Cartridge Fuses

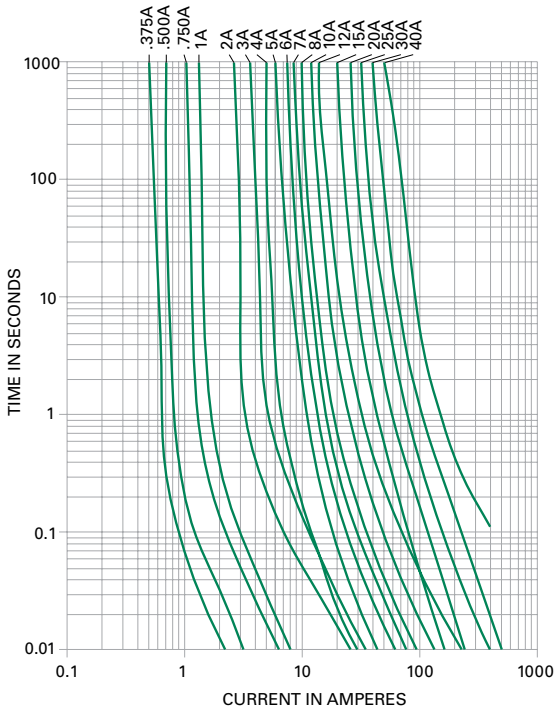
3AB > Fast-Acting > 314/324 Series

Temperature Re-rating Curve

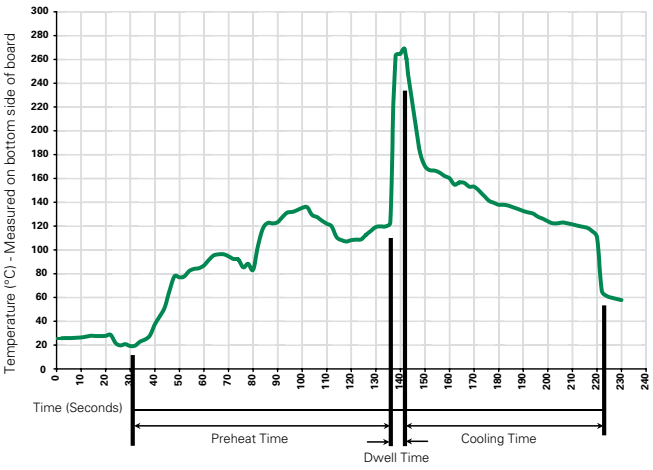


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

3AB > Fast-Acting > 314/324 Series

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Product Characteristics

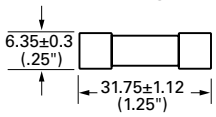
Materials	**Body:** Ceramic **Cap:** Nickel–plated Brass **Leads:** Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	**Cap1:** Brand logo, current and voltage ratings **Cap2:** Series and agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, -65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A (High RH (95%) and Elevated temperature (40°C) for 240 hours)
Salt Spray	MIL- STD-202, Method 101, Test Condition B

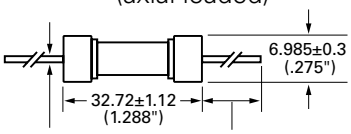
Dimensions

Measurements displayed in millimeters (inches)

314 000P **Series**
(cartridge)



324 000P **Series**
(axial leaded)



Axial Lead Diameter:
0.81±0.05 (.032") for (.125A - 15A)
1.02±0.06 (.040") for (20A - 40A)

Axial Lead Length:
38.1±3.15 (1.50") TYP.
52±3 (2.0") for Long Lead

Axial Lead Material:
Tin-coated copper

Part Numbering System

0314 xxxx M X P

Series

Amp Code
Refer to Amp Code column of Electrical Specification Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
314 Series				
Bulk	N/A	5	VX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MX52L (long lead)	N/A
Bulk	N/A	1000	MXCC	N/A
Bulk	N/A	1000	MX52LE (long lead)	N/A
324 Series				
Bulk	N/A	5	VX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MX280	N/A
Bulk	N/A	1000	MX52 (long lead)	N/A
Bulk	N/A	1000	MXF24	N/A

Additional Information

Datasheet 314 Series
Resources 314 Series
Samples 314 Series
Accessories 314 & 324 Series
Datasheet 324 Series
Resources 324 Series
Samples 324 Series

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	155100	Twist-Lock In-Line Fuseholder	32	20
	342	Traditional Panel Mount Fuseholder	250	20
	346	Panel Mount Flip-Top Shock-Safe Fuseholder	250	15
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options	250	20
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30
	101	Rivet/Eyelet Type Fuse Clip	1000	15

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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322/332 Series Lead-free 3AB, Very Fast-acting Fuse

Description

The 3AB Very Fast-Acting Fuse for protection of Silicon Controlled Rectifiers and similar solid-state devices.

Features

- In accordance with UL Standard 248-14
- Available in cartridge format only
- RoHS compliant and Lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Agency Approvals

Agency	Agency File Number	Ampere Range	Series
	E10480	12A - 30A	322
	E10480	1A - 10A	332
	NBK080306-JP1021A NBK080306-JP1021B	1-5A 6-10A	332
	N/A	1A - 30A	322/332

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	1 – 30	4 hours, Minimum
250%	1 – 10	.2 second, Maximum
	12 – 30	1 sec.ond, Maximum.

Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals			
001.	1	250	100A@250Vac 100A@125Vdc 200A@72Vdc	0.0927	0.146	x		x	x
1.25	1.25	250		0.0804	0.204	x		x	x
002.	2	250		0.0416	0.790	x		x	x
003.	3	250		0.0245	2.760	x		x	x
004.	4	250		0.0179	3.360	x		x	x
005.	5	250		0.0128	6.250	x		x	x
006.	6	250		0.0117	8.208	x		x	x
007.	7	250		0.0108	10.58	x		x	x
008.	8	250		0.0088	16.45	x		x	x
009.	9	250		0.0077	20.66	x		x	x
010.	10	250		0.0073	24.0	x		x	x
012.	12	65	200A@65Vac 1000A@65Vdc	0.0057	38.0		x		x
015.	15	65		0.0043	59.0		x		x
020.	20	65		0.0034	192.0		x		x
025.*	25	65		0.0029	325.0		x		x
030.*	30	65		0.0023	540.0		x		x

* Ratings from 1A to 10A are available for 332 series
* Ratings from 12A to 30A are available for 322 series, these ratings are RoHS compliant version.

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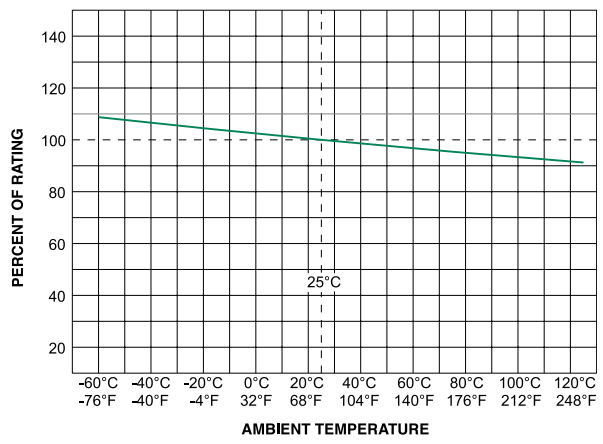
Axial Lead & Cartridge Fuses

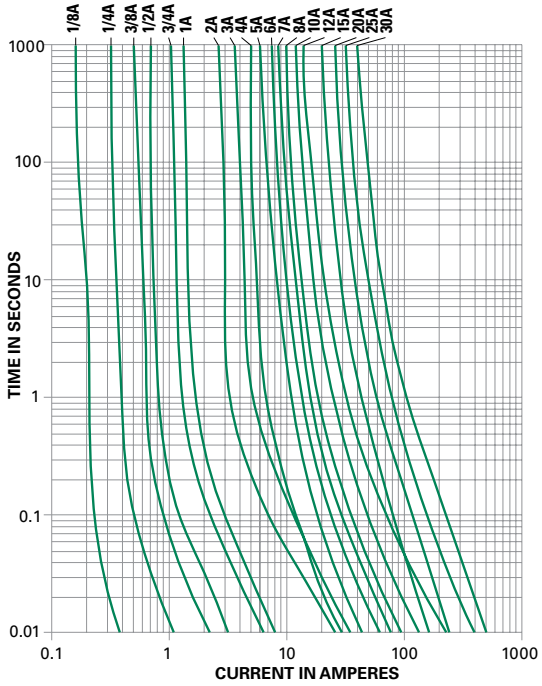
3AB > Very Fast-Acting > 322/332 Series

Temperature Re-rating Curve



Note:
Rerating depicted in this curve is in addition to the industry practice derating of 25% for continuous operation.

Average Time Current Curves



Product Characteristics

Materials	Body: Ceramic Cap: Nickel–plated brass
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and Elevated temperature (40°C) for 240 hours
Salt Spray	MIL- STD-202, Method 101, Test Condition B

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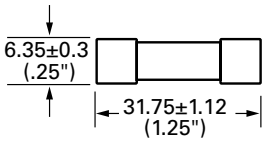
Dimensions

Measurements displayed in millimeters (inches)

322 000P / **332** 000P **Series**
(cartridge)



Part Numbering System

0322 xxxx M X P

- **Series**
- **Amp Code**
  Refer to Amp Code column of Electrical Characteristics Table
- **Quantity Code**
  M = 1000
- **Packaging Code**
  X = Filler
- **Lead-free**

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
322 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A
332 Series				
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A

Additional Information

Datasheet 322 Series | **Resources 322 Series** | **Samples 322 Series** | **Datasheet 332 Series** | **Resources 332 Series** | **Samples 332 Series** | **Accessories 322 & 332 Series**

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	155100	Twist-Lock In-Line Fuseholder	32	20
	342	Traditional Panel Mount Fuseholder	250	20
	346	Panel Mount Flip-Top Shock-Safe Fuseholder	250	15
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options	250	20
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30
	101	Rivet/Eyelet Type Fuse Clip	1000	15

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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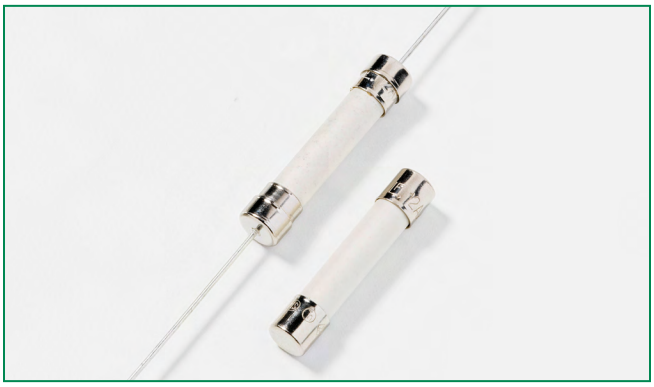
325/326 Series Lead-Free 3AB, Slo-Blo® Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
UL	E10480	0.250A - 10A
VDE	E10480	12A - 30A
CSA	29862	0.250A - 30A
PSE	Cartridge: NBK 030805-E10480A NBK 030805-E10480C NBK 030805-E10480E NBK 260106-JP1021A Leaded: NBK 030805-E10480B NBK 030805-E10480D NBK 030805-E10480F NBK 260106-JP1021B	 1A-3.2A 4A-5A 6.25A-15A 20A-30A 1A-3.2A 4A-5A 6.25A-15A 20A-30A
KC	SU05001-5010 SU05001-5011 SU05001-5012 SU05001-6006 SU05001-6007	7-10A 12A, 15A 20A 2.8A-3.2A 2.5A
EAC	T 50239752 01	*12A/*15A/*20A
CE	N/A	0.010A - 30A

* Approved for cartridge version only

Description

The 3AB Slo-Blo® Fuse with ceramic body construction permits higher interrupting ratings and voltage ratings. Ideal for applications where high current loads are expected.

Features

- In accordance with UL Standard 248-14
- Available in cartridge and axial lead format and with various forming dimensions
- RoHS compliant and Lead-free

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.010A – 30A	4 hours, Minimum
135%	0.010A – 30A	1 hour, Maximum
200%	0.010A – 3.2A	5 sec., Min., 30 sec., Max.
	4A – 30A	5 sec., Min., 60 sec., Max.

Additional Information

Datasheet 325 Series | **Resources 325 Series** | **Samples 325 Series** | **Accessories 325 Series**

Datasheet 326 Series | **Resources 326 Series** | **Samples 326 Series** | **Accessories 326 Series**

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals						
						PS E				CE		
.010	0.01	250	100A@250Vac	3324.8000	0.00013					x		
.031	0.031	250		332.5000	0.0110					x		
.062	0.062	250		91.7000	0.0276					x		
.100	0.1	250		33.5500	0.0870					x		
.125	0.125	250		22.4500	0.100					x		
.150	0.15	250		15.4500	0.143					x		
.175	0.175	250		8.9200	0.350					x		
.187	0.187	250		7.7250	0.330					x		
.200	0.2	250		6.7700	0.316					x		
.250	0.25	250	100A@250Vac 10KA@125Vac 10KA@125Vdc	4.4300	0.804			x	x	x		
.300	0.3	250		3.2200	1.230			x	x	x		
.375	0.375	250		2.1550	1.20			x	x	x		
.400	0.4	250		1.9350	1.33			x	x	x		
.500	0.5	250		1.3000	4.80			x	x	x		
.600	0.6	250		0.9495	3.90			x	x	x		
.700	0.7	250		0.7215	6.42			x	x	x		
.750	0.75	250		0.6410	13.00			x	x	x		
.800	0.8	250		0.5725	8.20			x	x	x		
001.	1	250		0.3890	16.3	x		x	x	x		
01.2	1.2	250		0.2860	22.0	x		x	x	x		
1.25	1.25	250		0.2680	40.0	x		x	x	x		
01.5	1.5	250		0.1975	59.7	x		x	x	x		
01.6	1.6	250		0.1760	66.0	x		x	x	x		
002.	2	250		0.1210	118.0	x		x	x	x		
02.5	2.5	250		0.0835	185.0	x		x	x	x		x
02.8	2.8	250		0.0695	232.0	x		x	x	x		x
003.	3	250		0.0605	200.0	x		x	x	x		x
03.2	3.2	250	100A@250Vac 10KA@125Vac	0.0539	214.0	x		x	x	x		x
004.	4	250	400A@250Vac 10KA@125Vac 10KA@125Vdc	0.0761	9.71	x		x	x	x		
005.	5	250		0.0522	25.0	x		x	x	x		
6.25	6.25	250		0.0346	60.4	x		x	x	x		
007.	7	250		0.0227	47.3	x		x	x	x		x
008.	8	250		0.0193	67.1	x		x	x	x		x
010.	10	250		0.0132	137	x		x	x	x		x
012.	12	250	400A@250Vac 10KA@125Vac 600A@125Vdc	0.0067	129	x	x	x		x	x***	x
012.*	12	250	1500A@250Vac	0.0011	618		x	x		x		
015.	15	250	400A@250Vac 10KA@125Vac 600A@125Vdc	0.0050	245	x	x	x		x	x***	x
015.*	15	250	1500A@250Vac	0.0083	760		x	x		x		
020.	20	250	400A@250Vac 10KA@125Vac 600A@125Vdc	0.0034	575	x	x	x		x	x***	x
020.*	20	250	1500A@250Vac	0.0042	2500		x	x		x		
025.**	25	250	1500A@250Vac	0.0032	4682		x			x		
025.	25	250	400A@250Vac 10KA@60Vdc 600A@125Vdc	0.0024	1030	x	x	x		x		
030.	30	250		0.0019	1690	x	x	x		x		

*Higher i^2t version available. Please add suffix "D" to part numbers. For instance, 0325020.MXDP, 0326020.MXDP
I^2t test at 10× rated current.
**Higher I^2t version available. Please add suffix "W" to part numbers. For instance, 0325025.MXWP
***Approved for cartridge versions only, and interrupting rating is 400A@125Vac and 400A@250Vac

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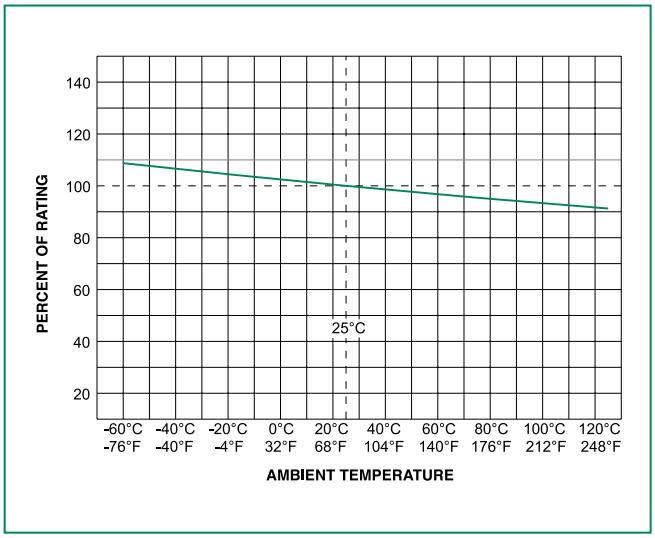
Revised: 03/03/17

Axial Lead & Cartridge Fuses

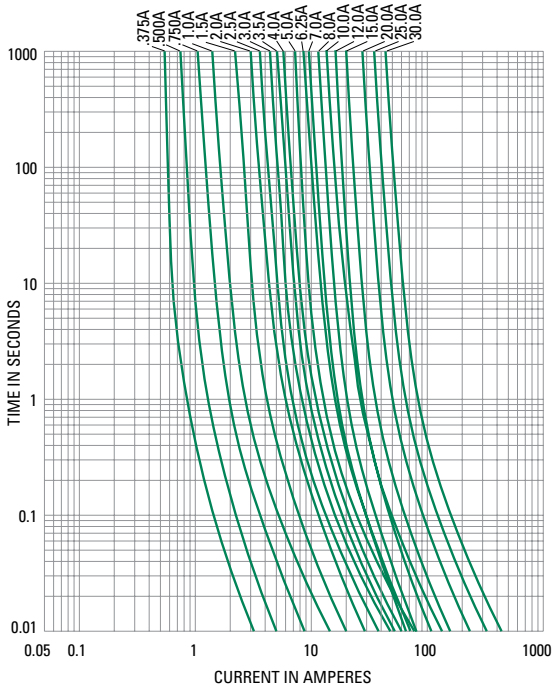
3AB > Slo-Blo® Fuse > 325/326 Series

Temperature Re-rating Curve

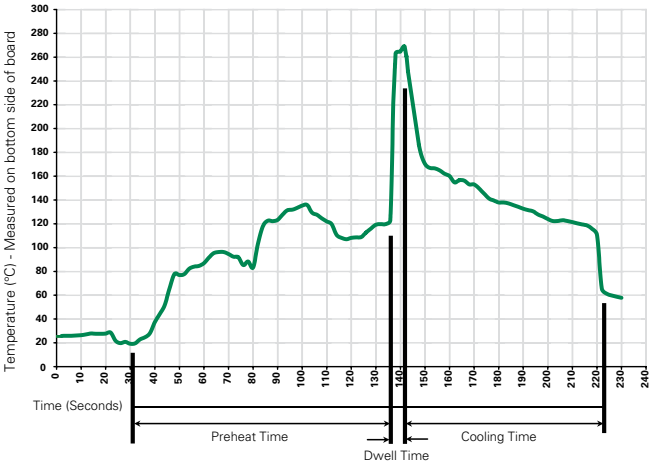


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Product Characteristics

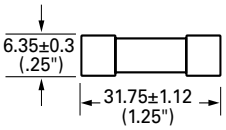
Materials	Body: Ceramic Cap: Nickel–plated brass Leads: Tin–plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B:(5 cycles - 65°C to 125°C)
Vibration:	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and Elevated temperature(40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

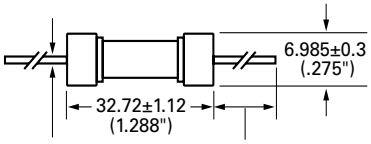
Dimensions

Measurements displayed in millimeters (inches)

326 000P **Series**
(cartridge)



325 000P **Series**
(axial leaded)

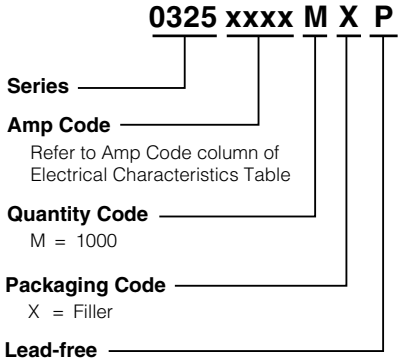


Axial Lead Diameter:
0.81±0.05 (.032") for (0.01A - 15A)
1.02±0.06 (.040") for (20A - 30A)

Axial Lead Length:
38.1±3.15 (1.50") TYP.
52±1(2.0") for long lead

Axial Lead Material:
Tin-coated copper

Part Numbering System



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
325 Series				
Bulk	N/A	5	VX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MX52 (long lead)	N/A
Bulk	N/A	1000	MX52L (long lead)	N/A
Bulk	N/A	1000	MXD	N/A
Bulk	N/A	1000	MXF31	N/A
Bulk	N/A	1000	MXW	N/A
326 Series				
Bulk	N/A	5	VX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXCC	N/A
Bulk	N/A	1000	MXD	N/A

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Axial Lead & Cartridge Fuses

3AB > Slo-Blo® Fuse > 325/326 Series

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	155100	Twist-Lock In-Line Fuseholder	32	20
	342	Traditional Panel Mount Fuseholder	250	20
	346	Panel Mount Flip-Top Shock-Safe Fuseholder	250	15
	345	Shock-Safe Fuseholder with PC Mount, Solder Mount and Panel Mount options	250	20
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30
	101	Rivet/Eyelet Type Fuse Clip	1000	15

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact Littelfuse for applications greater than the max voltage and amperage shown.

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Axial Lead & Cartridge Fuses

3AB > High I²t > 328 Series

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328 Series, Lead-Free 3AB, High Surge Withstand Fuse

Description

The 328 Series is a 300VAC rated, 10kA surge withstand, 6.3×32mm ceramic fuse, designed in accordance to UL248-14 Standard, provided in cartridge and axial-lead packages.

Features

- High surge withstand capability
  - 20 hits of 10kA 8/20µs surge
  - Meets ANSI/IEEE C62.41.2, Category C-High
  - Meets US Dept of Energy (DOE) MSSLC/ CBEA street lighting and parking lot lighting, elevated level
- Small form factor (6.3×32mm) with cartridge and axial-lead package options
- Breaking capacity: 200A@300VAC, 200A@100VDC
- Lead-free, RoHS compliant, halogen-free
- Compliant with UL248-14
- Operating temperature: –55°C to 125°C

Agency Approvals

Agency	Agency File Number	Ampere Range
	T 50260582 01	21A
	E10480	21A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 hours, minimum
200%	120 sec., maximum

Applications

Commercial and outdoor LED luminaries

Outdoor electronics and electrical equipment.

Surge protection for telecom application.

Electrical Characteristic by Item

Amp Rating (A)	Voltage Rating (VAC)	Interrupting Rating	Surge Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I²t (A²sec)	Agency Approvals	
21	300	200A@300VAC 200A@100VDC	1.2/50 - 8/20µs, 20kV/10kA 20 hits	0.0042	4,800	X	X

Additional Information

Datasheet | **Resources** | **Samples** | **Accessories**

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

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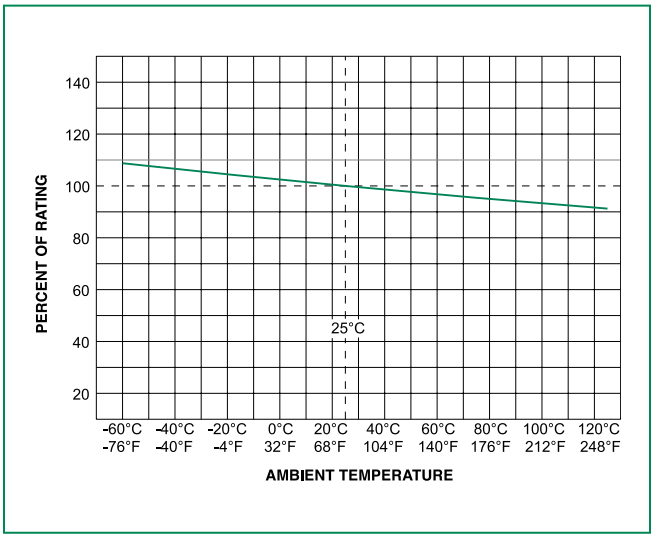
Revised: 03/03/17

Axial Lead & Cartridge Fuses

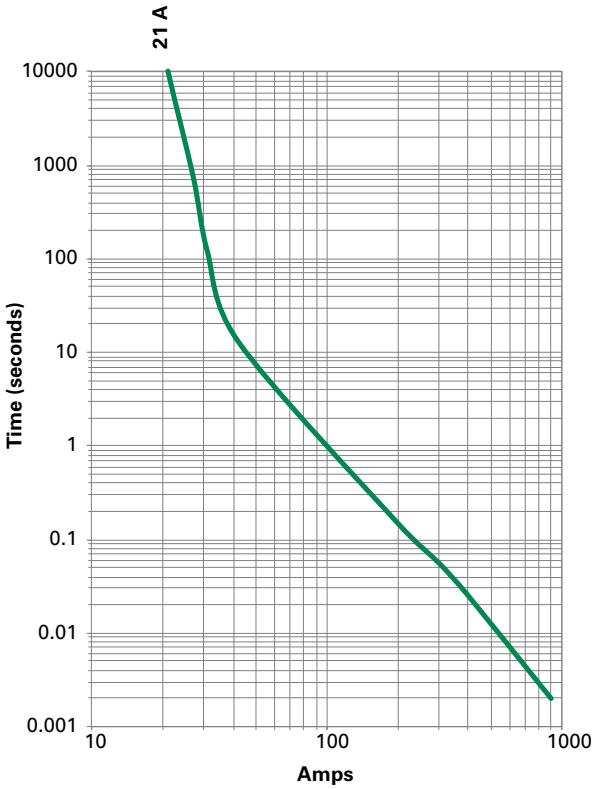
3AB > High I²t > 328 Series

Temperature Re-rating Curve

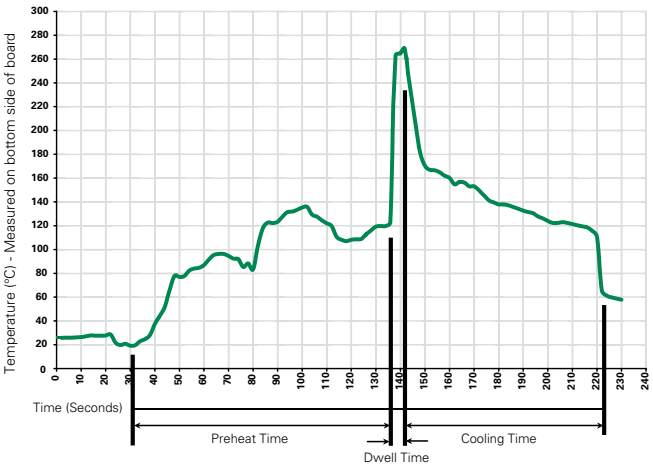


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60–180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2–5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C ±5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Axial Lead & Cartridge Fuses

3AB > High I²t > 328 Series

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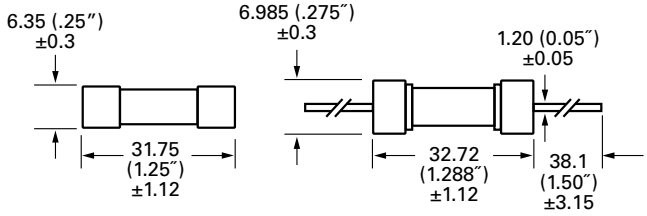
Product Characteristics

Materials	Body: Ceramic Cap: Nickel–plated brass Leads: Tin–plated copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles –65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A. High RH (95%) and elevated temperature (40°C) for 240 hours.
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

Measurements displayed in millimeters (inches).



Part Numbering System

0328 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Codes
Blank: Cartridge Type Fuse
E: Axial Lead Fuse

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
328 Series				
Bulk	N/A	1000	MX	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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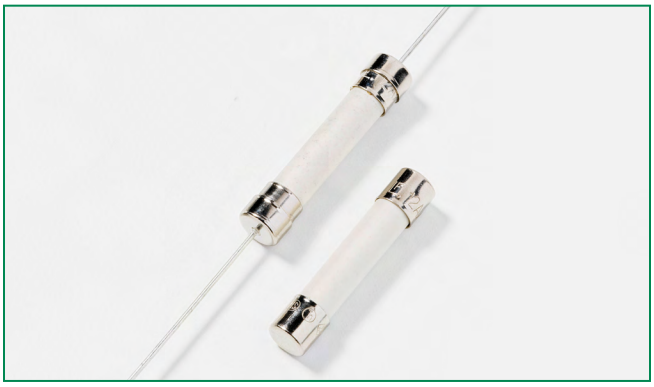
Revised: 03/03/17

505 Series, Lead-free 3AB, Fast-Acting Fuse



Description

A 500VAC/VDC rated ceramic fuse with remarkable interrupting rating in a compact 6.3 x 32mm package, which is well suited for circuit protection in high energy applications.

Features

- In accordance with Underwriters Laboratories Standard UL 248-14
- Available in cartridge and axial lead form and with various lead forming dimensions.
- RoHS compliant and Lead-free
- Superior Interrupting rating of 20,000 Amperes
- Compact form factor of 6.3mm x 32mm

Agency Approvals

Agency	Agency File Number	Ampere Range
c UL us	E10480	10A - 30A
	1312914	10A - 12A
CE	N/A	10A - 30A
	T5026910801	15 - 30A

Applications

- Uninterruptible Power Supplies (UPS)
- Three-Phase Power Supplies

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
150%	10 – 30	30 minutes, Maximum
200%		30 minutes, Maximum
300%		10 sec., Maximum

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec)	Agency Approvals			
						c UL us		CE	
010.	10	450	20kA@450VAC 1000A@250VDC	0.0167	91	x	x	x	
010.*	10	500	200A@500VAC 200A@500VDC	0.0167	91	x		x	
012.	12	450	20kA@450VAC 1000A@250VDC	0.0117	192	x	x	x	
015.	15	500	50kA@500VAC 20kA@500VDC	0.0073	68	x		x	x
016.	16	500		0.0073	68	x		x	x
020.	20	500	30kA@500VAC 20kA@500VDC	0.0056	140	x		x	x
025.	25	500		0.0048	210	x		x	x
030.	30	500		0.0038	280	x		x	x

Notes:
1. 20kA@500VAC&20kA@500VDC interrupting rating available for TUV certification of 15~30A
2. *200A@500Vac&200A@500Vdc interrupting rating available for 10A. Add suffix "500" Example: 0505010.MX500P, and 0505010.MXE500P"

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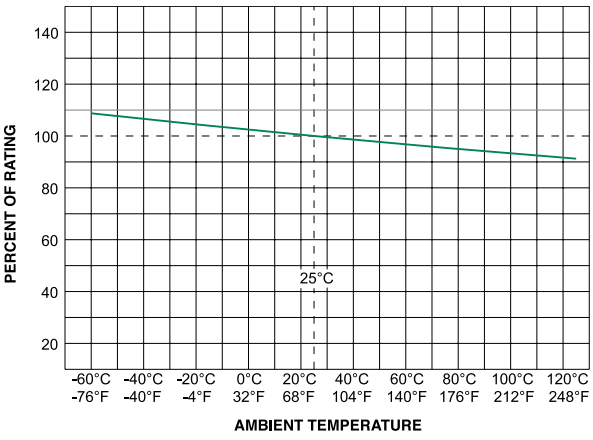
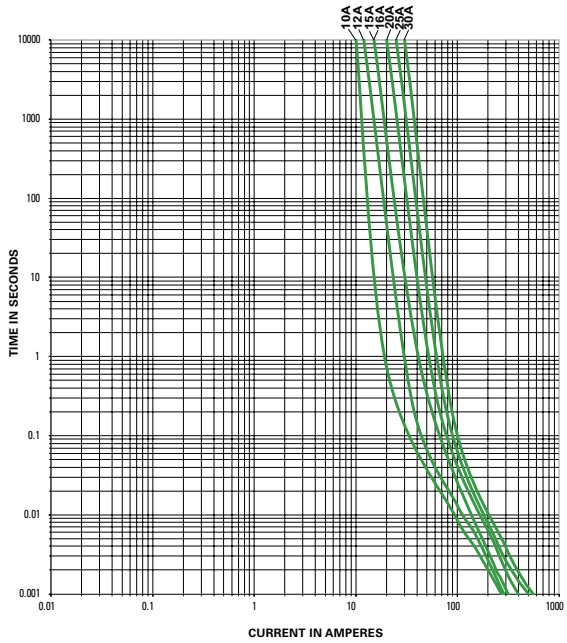
Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

Temperature Re-rating Curve

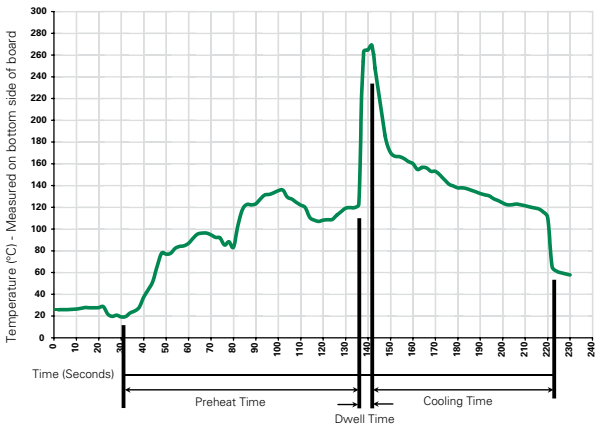


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100° C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	270°C
Solder Dwell Time:	10 seconds Maximum

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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Specifications are subject to change without notice.

Revised: 03/03/17

Axial Lead & Cartridge Fuses

3AB > Fast-Acting > 505 Series

Product Characteristics

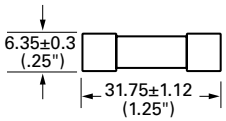
Materials	Body : Ceramic Cap : Nickel–plated brass Leads : Tin-plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1 : Brand logo, current and voltage ratings Cap2 : Series and agency approval marks

Operating Temperature:	–55°C to 125°C.
Thermal Shock:	MIL-STD-202, Method 107, Test Condition B (5 Cycles -65°C to +125°C).
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High relative humidity (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

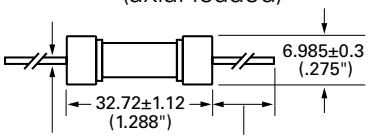
Dimensions

Measurements displayed in millimeters (inches)

505 000P **Series**
(cartridge)



505 000P **Series**
(axial leaded)



Axial Lead Diameter:
0.81±0.05 (.032") for (10A - 16A)
1.02±0.06 (.040") for (20A - 30A)

Axial Lead Length:
38.1±3.15 (1.50") TYP.
52±1 (2.0") for long lead

Axial Lead Material:
Tin-coated copper

Part Numbering System

0505 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Codes
E : Axial Leaded
52LE : 52mm length
Others : special options.
Please call
Littelfuse for detail.

Lead-Free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
505 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A
Bulk	N/A	1000	MX52LE	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	150322	In-Line Fuseholder	500	15
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30
	101	Rivet/Eyelet Type Fuse Clip	1000	15

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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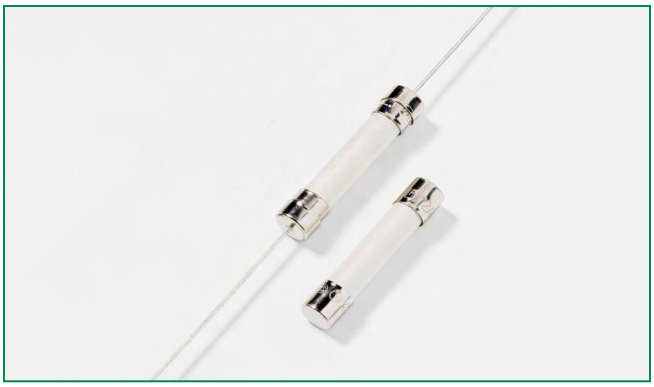
Revised: 03/03/17

506 Series Lead-Free 3AB, Fast-Acting Fuse



Description

A 600Vdc rated ceramic fuse with remarkable interrupting rating in a compact 6.3×32mm package, which is well suited for circuit protection in high DC energy applications.

Features

- In accordance with Underwriter's Laboratories Standard, UL 248-14.
- Available in cartridge and axial lead form.
- Lead-free, Halogen free, and RoHS compliant.
- Superior interrupting rating of 10,000 Amperes.
- Compact form factor of 6.3×32mm.

Agency Approvals

AGENCY	CERTIFICATE NUMBER	AMPERE RANGE
c UL us	E10480	15A - 20A
CE	N/A	15A - 20A

Applications

High energy and power efficient applications.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	15A - 20A	3600 sec, Min
135%		3600 sec, Max
200%		120 sec, Max

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristic by Item

Amp Rating (A)	Amp Code	Voltage Rating (DC)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 sec.)	Agency Approvals
						c UL us
15	015	600	10KA @ 600VDC	0.008	61	x
16	016	600		0.008	61	x
20	020	600		0.006	105	x

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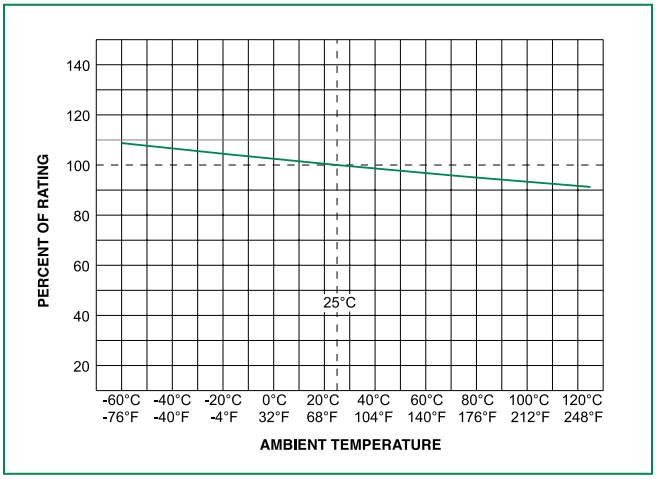
Axial Lead & Cartridge Fuses

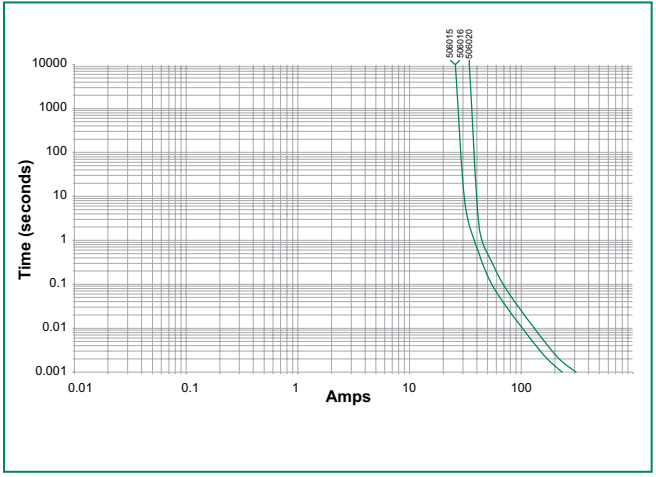
3AB > Fast-Acting > 506 Series

Temperature Re-rating Curve



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

Average Time Current Curves



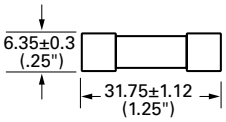
Product Characteristics

Materials	Body : Ceramic Cap : Nickel Plated Brass
Terminal Strength	MIL-STD-202, Method 211, Test condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1 : Brand logo, current and voltage ratings Cap2 : Series and agency approval marks

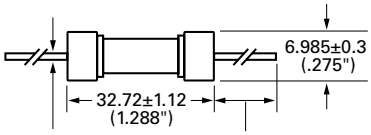
Operating Temperature	–55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test condition B: (5 cycles -65°C to 125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test condition A: High relative humidity (95%) and Elevated temperature (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test condition B

Dimensions

506 000P **Series**
(cartridge)



506 000P **Series**
(axial leaded)



Axial Lead Diameter:
1.2±0.05 (.047")

Axial Lead Length:
38.1±3.15 (1.50") TYP.

Axial Lead Material:
Tin-coated copper

Part Numbering System

0506 xxxx M X E P

- SERIES
- AMP Code
  Refer to Amp Code column of Electrical Characteristics Table
- QUANTITY Code
  M = 1000
- PACKAGING Code
  X = Filler
- OPTION Code
  E = Axial Leaded
- Lead-Free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
506 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A

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Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	150322	In-Line Fuseholder	500	15
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30
	101	Rivet/Eyelet Type Fuse Clip	1000	15

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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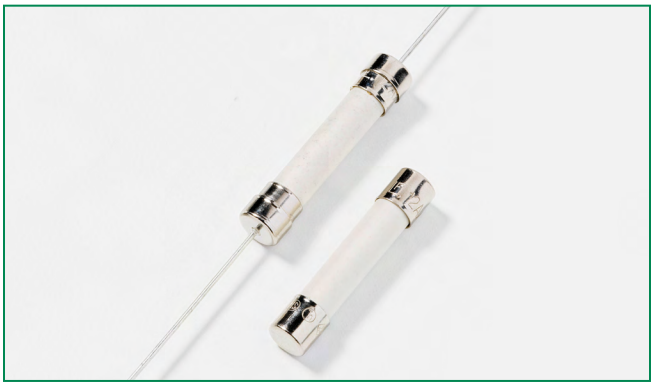
Axial Lead & Cartridge Fuses

3AB 1000Vac/dc High Voltage Fuse

508 Series Lead-Free 3AB Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
cULus	E10480	0.315A - 1A
CE	N/A	0.315A - 1A

Electrical Characteristics

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.315A - 1A	4 Hours, Minimum
135%		1 Hour, Maximum
200%		120 Seconds, Maximum

Description

A 1000Vac/Vdc rated ceramic fuse with remarkable interrupting rating in a compact 6.3×32mm package, which is well suited for circuit protection in high energy applications.

Features

- In accordance with Underwriter's Laboratories Standard UL 248-14
- Available in cartridge and axial lead
- RoHS compliant and Lead-free
- Superior Interrupting rating of 10,000 Amperes
- Compact form factor of 6.3×32mm

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Additional Information

Datasheet | Resources | Samples | Accessories

For recommended fuse accessories for this product series, see 'Recommended Accessories' section.

Electrical Characteristic

Amp Code	Amp Rating	Voltage Rating	Interrupting Rating	Nominal Cold Resistance (mohms)	Nominal Melting I^2t (A^2 sec.)	Agency Approvals	
						cULus	CE
.315	0.315	1000	10kA @ 1000Vac 10kA @ 1000Vdc	9200	0.071	x	x
.500	0.5	1000		3572	0.259	x	x
001	1	1000		1580	0.449	x	x

* 10KA@600Vac/dc also cURus approved. Add suffix "6". Example: 0508.315MX6P.

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Axial Lead & Cartridge Fuses

3AB 1000VAC / DC High Voltage Fuse

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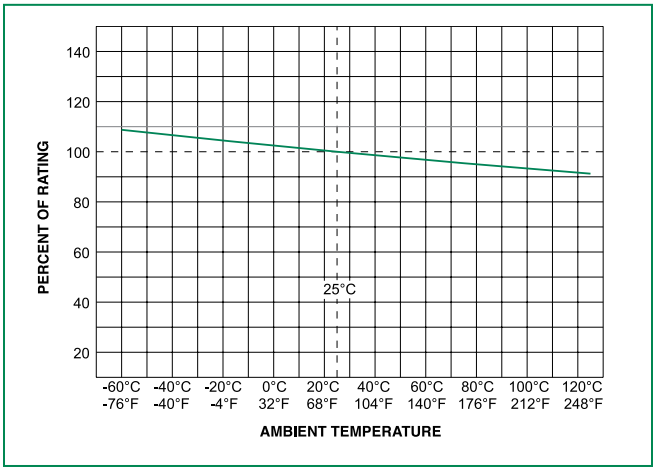
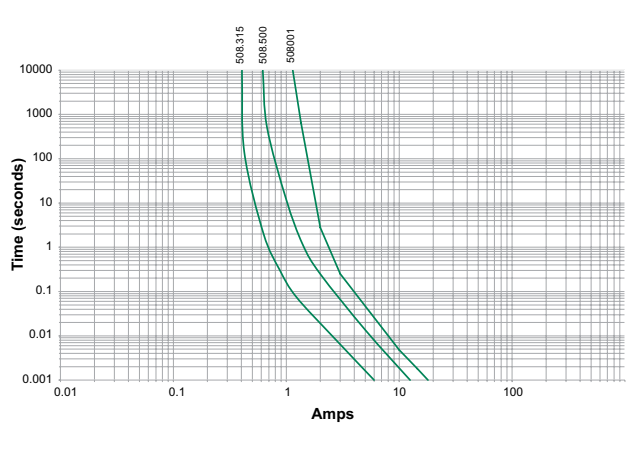
Temperature Re-rating Curve

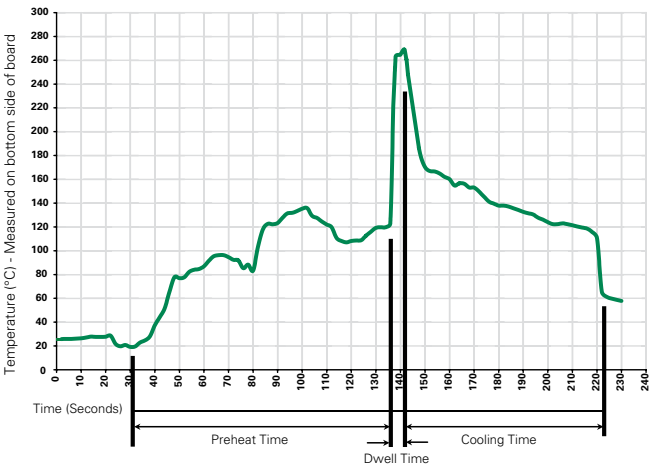


Note:
Rerating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Product Characteristics

Materials	Body : Ceramic Cap : Nickel–plated brass Leads : Tin-plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1 : Brand logo, current and voltage ratings Cap2 : Series and agency approval marks

Operating Temperature:	–55°C to 125°C.
Thermal Shock:	MIL-STD-202, Method 107, Test Condition B (5 Cycles -65°C to +125°C).
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High relative humidity (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

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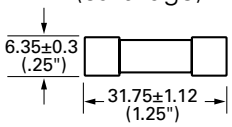
Axial Lead & Cartridge Fuses

3AB 1000Vac/dc High Voltage Fuse

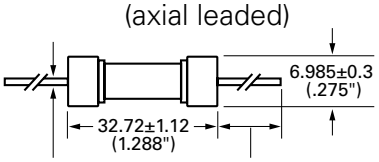
Dimensions

Measurements displayed in millimeters (inches)

508 000P **Series**
(cartridge)



508 000EP **Series**
(axial leaded)



Axial Lead Diameter:
0.81±0.05 (.032")

Axial Lead Material:
Tin-coated copper

Axial Lead Length:
Standard Length:
39.68 (1.56") TYP.
Short Lead Option:
12.70 (0.50") TYP

Part Numbering System

0508 xxxx M X E P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Option Codes
Blank : Cartidage Type Fuse
E : Axial Lead Fuse

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Reel Size
508 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MXE	N/A

Recommended Accessories

Accessory Type	Series	Description	Max Application Voltage	Max Application Amperage
Holder	150322	In-Line Fuseholder	500	15
Block	354	Low Profile OMNI-BLOK® Fuse Block	600	30
	359	High Current Screw Terminal Fuse Block		30
Clip	122	High Current Traditional PC Board Fuse Clip	1000	30
	101	Rivet/Eyelet Type Fuse Clip	1000	15

Notes:
1. Do not use in applications above rating.
2. Please refer to fuseholder data sheet for specific re-rating information.
3. Please contact factory for applications greater than the max voltage and amperage shown.

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Axial Lead & Cartridge Fuses

6x25mm > 70VDC Fuse > 688 Series

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688 Series Lead-Free, 6x25mm Fuse

Description

A 70Vdc rated ceramic fuse with remarkable interrupting rating in a compact 6x25mm package, which is well suited for circuit protection in telecom applications.

Features

- In accordance with Underwriter's Laboratories Standard UL 248-14
- Available in cartridge version
- RoHS compliant and Lead-free

Applications

- PDU in Telecom Datacenter
- Wireless Transmission Base Station

Agency Approvals

Agency	Agency File Number	Ampere Range
	T 50257715 01	30A
	E10480	5A - 40A

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	5A - 40A	4 Hours, **Min.**
200%		120 Second, **Max.**

Additional Information

Datasheet | **Resources** | **Samples**

Electrical Characteristic Specifications by Item

Amp Code	Amp Rating	Voltage Rating	Interrupting Rating	Nominal Cold Resistance (mOhms)	Nominal Melting I^2t Under 10In (A^2 sec)	Agency Approvals	
005.	5	70Vdc	2500A @ 70Vdc	22	118		x
006.	6	70Vdc	2500A @ 70Vdc	21	132		x
010.	10	70Vdc	2500A @ 70Vdc	10	570		x
015.	15	70Vdc	2500A @ 70Vdc	6	554		x
030.*	30	70Vdc	2500A @ 70Vdc	2.1	4200	x	x
040.*	40	70Vdc 250Vac	2500A @ 70Vdc 1500A @ 250Vac	1.55	7800		x

Note: *Surge rating: 1.2/50-8/20µs, 20KV/10KA surge is available for 30A and 40A.

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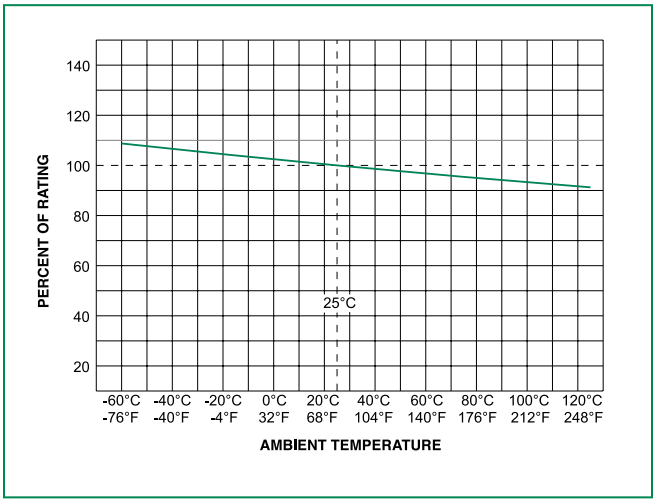
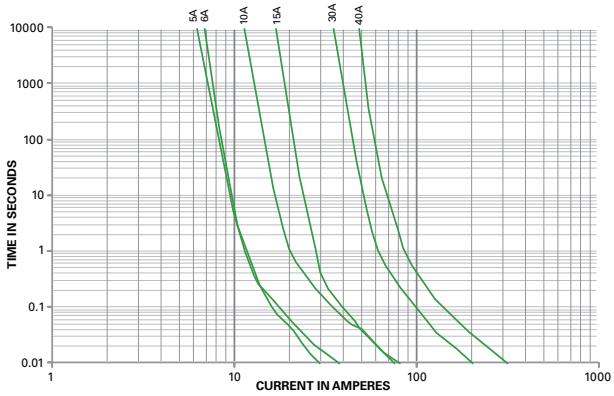
Axial Lead & Cartridge Fuses

6x25mm > 70VDC Fuse > 688 Series

Temperature Re-rating Curve

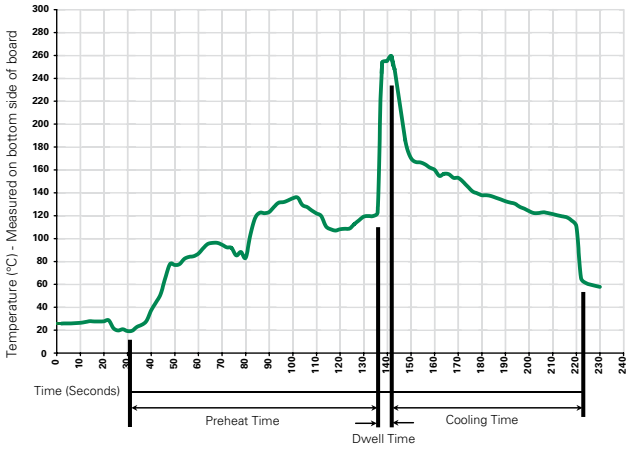


Average Time Current Curves



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

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

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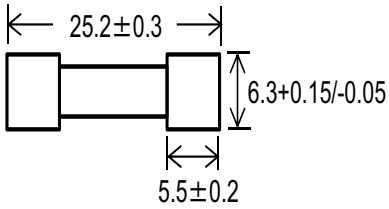
Product Characteristics

Materials	Body : Ceramic Cap : Tin–plated Copper Leads: Tin-plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Brand logo, current and voltage ratings, agency approval marks
Packaging	Available in Bulk and Ammo packaging (M=1000 pcs/pkg)

Operating Temperature:	–55°C to 125°C.
Thermal Shock:	MIL-STD-202, Method 107, Test Condition B
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%) and elevated temp (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

Measurements displayed in millimeters



Part Numbering System

0688 xxxx M X P

Series

Amp Code
Refer to Amp Code column of Electrical Characteristics Table

Quantity Code
M = 1000

Packaging Code
X = Filler

Lead-free

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
688 Series				
Ammo	N/A	1000	MAT4P	N/A
Bulk	N/A	1000	MX	N/A

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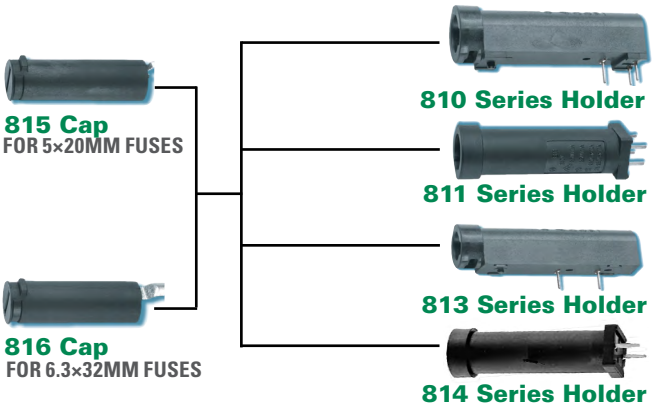
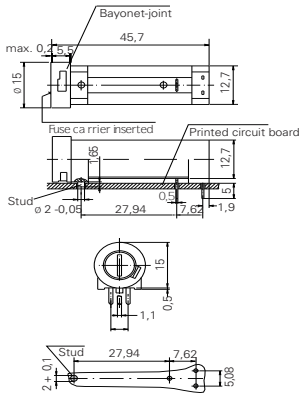
810/811/813/814 Series Circuit Board Mount Enclosed Fuse Holders



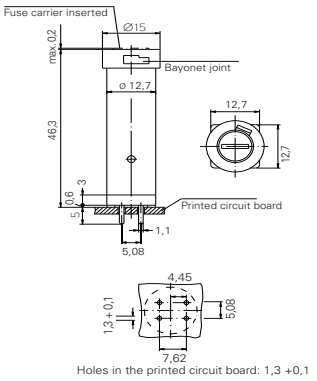
Dimensions

810 Series



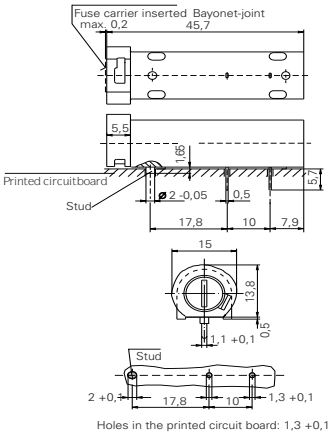
Holes in the printed circuit board: *1,3 +0,1*

811 Series



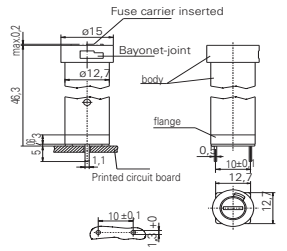
Holes in the printed circuit board: 1,3 +0,1

813 Series



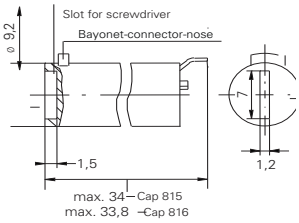
Holes in the printed circuit board: 1,3 +0,1

814 Series



Holes in the printed circuit board: 1,3 +0,1

815/816 Cap



Product Characteristics

	810 Series	811 Series	813 Series	814 Series
Compatible Fuse Types	**5×20mm 6.3×32mm**	**5×20mm 6.3×32mm**	**5×20mm 6.3×32mm**	**5×20mm 6.3×32mm**
Materials	**Holder/Cap:** Black Thermoplastic, UL94 V-0			
	Metal Parts: Copper alloy, corrosion protected			
	Terminals: Solderable, tinned			
Electrical Data (23°C)	**Rated Voltage:** 250V			
	Rated Current: 6.3A (VDE) 16A (UL/CSA)			
	Rated Power: 2.5W (VDE)		**RatedPower:** 1.6W (813+815 - VDE) 2.5W (813+816 - VDE)	**Rated Power:** 2.5W (813+816 - VDE)
Mounting	(3) Solder pins 0.5mm × 1.1mm and plastic stud. The pins spaced at 5.08mm form a common connection.	(4) Solder pins 0.5mm × 1.1mm The pins spaced at 5.08mm form a common connection.	(2) Solder pins 0.5mm × 1.1mm and plastic stud	(2) Solder pins 0.5mm × 1.1mm
Protection Class & Category	IP 40 (IEC 60529) PC2 (IEC 60127-6)			
Operating Temperature	-25 °C to 70 °C			
Climatic Test	-25°C/+70°C/21 days (IEC 60068-2-1...3)			
Stock Conditions	+10°C to +60°C relative humidity ≤ 75% yearly average, without dew, maximum value for 30 days - 95%			
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration			
Contact Resistance	≤ 5mΩ			
Dielectric Strength	> 1.5 kV			
Impulse Voltage	4 kV, 50 Hz, 1 min., dry			
Insulation Resistance	> 10^3 MΩ (500 VDC, 1 min.)			
Solderability	235°C, 3 sec. (Wave) 350°C, 1 sec. (Soldering Iron)			
Soldering Heat Resistance	260°C, 5 sec. (IEC 60068-2-20)			
Min Cross Section	Conducting path - 0.2mm²			
Marking	810, 250V, Approvals	811, 250V, Approvals	813, 250V, Approvals	814, 250V, Approvals
Unit Weight	5.4g(Holder) / 2.5g (Cap)	5.2g(Holder) / 2.5g (Cap)	5.8g (Holder) / 2.5g (Cap)	4.6g (Holder) 25g (Cap)

Agency approvals and ordering infornation is included on the next page.

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Cartridge Fuse Holders

Enclosed Fuseholders > Circuit Board Mounted

Littelfuse
Expertise Applied | Answers Delivered

Agency Approvals

Agency	Agency File Number			
	810 Series	**811 Series**	**813 Series**	**814 Series**
VDE	118611	120642	118349	118347
UL	E 70164	E 70164	E70164	E70164
CSA	47574	47574	47574	47574

Ordering Information

Description	Ordering Number	Packaging
Cap, 5x20 mm	815 0000 0005	Bulk 100
Cap, 6.3x32 mm	816 0000 0005	Bulk 100
810 Series Holder	810 0000 0005	Bulk 100
811 Series Holder	811 0000 0005	Bulk 100
813 Series Holder	813 0000 0005	Bulk 100
814 Series Holder	814 0000 0005	Bulk 100

Additional Information

Datasheet 810 Series | **Resources 810 Series** | **Samples 810 Series**

Datasheet 811 Series | **Resources 811 Series** | **Samples 811 Series**

Datasheet 813 Series | **Resources 813 Series** | **Samples 813 Series**

Datasheet 814 Series | **Resources 814 Series** | **Samples 814 Series**

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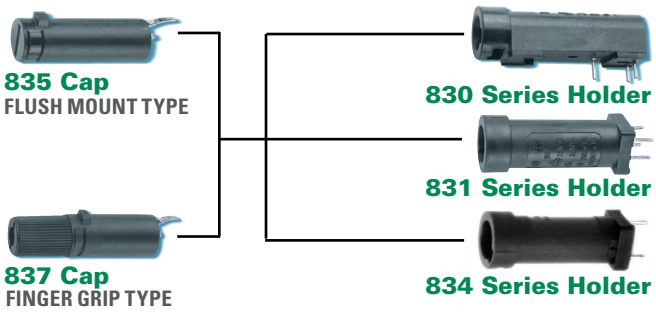
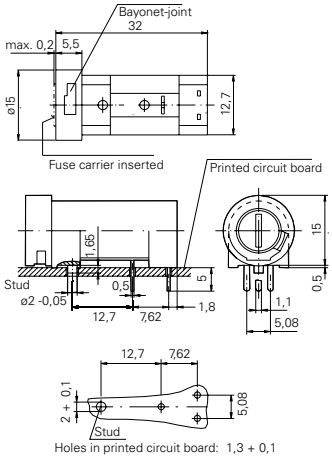
830/831/834 Series Circuit Board Mount Enclosed Fuse Holders



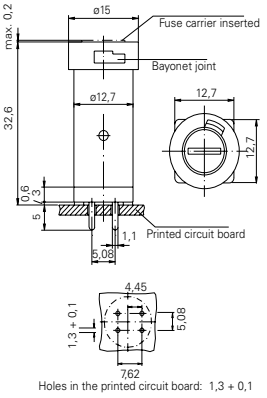
Not for new designs - refer to No. 862

Product Dimensions

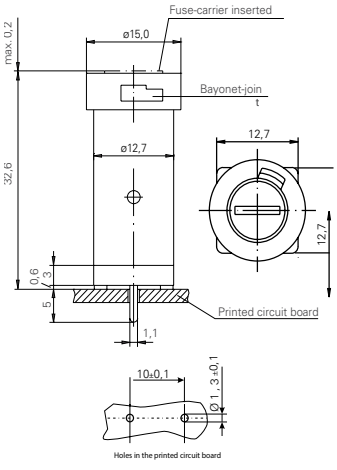
830 Series



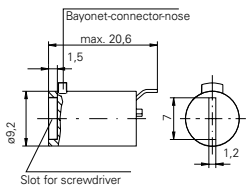
831 Series



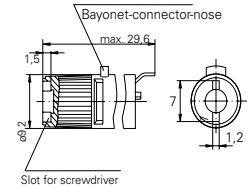
834 Series



835 Cap



837 Cap



Product Characteristics

	830 Series	831 Series	834 Series
Compatible Fuse Types	**5x20mm**	**5x20mm**	**5x20mm**
Materials	**Holder/Cap:** Black Thermoplastic, UL94 V-0		
	Metal Parts: Copper alloy, corrosion protected		
	Terminals: Solderable, tinned		
Electrical Data (23°C)	**Rated Voltage:** 250V		
	Rated Current: 6.3A (VDE) 16A (UL/CSA)		
	Rated Power: 1.6W (VDE)	**Rated Power:** 2.5W (VDE)	**Rated Power:** 2.5W (VDE with 835 cap)
Mounting	(3) Solder pins 0.5mm×1.1mm and plastic stud. The pins spaced at 5.08mm form a common connection.	(4) Solder pins 0.5mm×1.1mm The pins spaced at 5.08mm form a common connection.	(2) Solder pins 0.5mm×1.1mm
Protection Class & Category	IP 40 (IEC 60529) PC2 (IEC 60127-6)		
Operating Temperature	-25 °C to 70 °C		
Climatic Test	-25°C/+70°C/21 days (IEC 60068-2-1...3)		
Stock Conditions	+10°C to +60°C relative humidity ≤ 75% yearly average, without dew, maximum value for 30 days - 95%		
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration		
Contact Resistance	≤ 5mΩ		
Dielectric Strength	> 1.5 kV		
Impulse Voltage	4 kV, 50 Hz, 1 min., dry		4 kV with 1,2µs/50µs
Insulation Resistance	> 10^3 MΩ (500 VDC, 1 min.)		
Solderability	235°C, 3 sec. (Wave) 350°C, 1 sec. (Soldering Iron)		235°C, 2 sec. (Soldering bath) (IEC 60068-2-20) 350°C, 3 sec. (Soldering Iron) (IEC 60068-2-20)
Soldering Heat Resistance	260°C, 5 sec. (IEC 60068-2-20)		260°C, 5 sec. (Soldering bath) (IEC 60068-2-20)
Minimum Cross Section	Conducting path - 0.2mm²		
Marking	830, 250V, Approvals	831, 250V, Approvals	834, 250V, Approvals
Unit Weight	4.4g (Holder) / 1.6g (835) / 2.2g (837)	4.1g (Holder) / 1.6g (835) / 2.2g (837)	3,5g (834) / 1,6g (835) / 2,2g (837)

Agency approvals and ordering infornation is included on the next page.

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Agency Approval

Agency	Agency File Number		
	830 Series	**831 Series**	**834 Series**
VDE	120623	123441	6913
UL	E70164		
CSA	47574		

Ordering Information

Ordering PN	Description
Fuseholder	
830 0000 0005	ACS 5×20mm Fuseholder 830 Series for 250V
831 0000 0005	ACS 5×20mm Fuseholder 831 Series for 250V
834 0000 0005	ACS 5×20mm Fuseholder 834 Series for 250V
Fuseholder Cap	
835 0000 0005	ACS 5×20mm Fuseholder CAP 835 Series
837 0000 0005	ACS 5×20mm Fuseholder CAP 837 Series

Additional Information

Datasheet 830 Series | **Resources 830 Series** | **Samples 830 Series**

Datasheet 831 Series | **Resources 831 Series** | **Samples 831 Series**

Datasheet 834 Series | **Resources 834 Series** | **Samples 834 Series**

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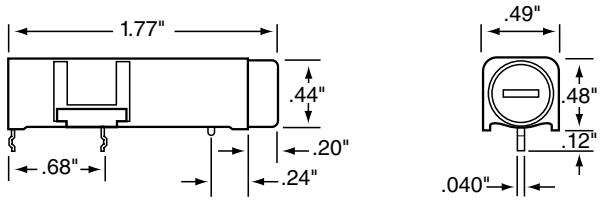
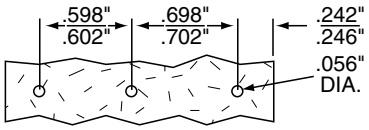
345 Series Shock Safe Circuit Board Mount Enclosed Fuse Holders

Dimensions



Recommended hole Pattern



Additional Information

Datasheet | Resources | Samples

Product Characteristics

Compatible Fuse Types	**3AG** **3AB** **5x20mm**
Description	Similar to our Shock-Safe panel mount fuseholders, this series is designed per IEC Standards 60127-6. Two different knob styles available are available for use with 3AG and 3AB (¼" × 1¼") or 5 × 20mm fuses.
Electrical	Insulation Resistance: 10,000 megohm minimum at 500 VDC. Contact Resistance: Less than .005 ohm average at a current of one ampere.
Dielectric Strength	4000 volts minimum. Mounting: Intended for soldering to printed circuit boards.
Molded Parts	Body Material: Black glass-filled thermoplastic (UL 94V0).
Knob	Screwdriver slot, fuse extractor type with nickel-plated, copper alloy insert. Spring-loaded, bayonet style. Knob Material: Grey or Black glass-filled thermoplastic (UL94 V-0)
Terminals	Brass. Tin-plated.
Ambient Temperature	–40°C to +85°C.

Agency Approvals

Agency	Agency File Number
	E14721
	7316
	133923

* Please refer to Fuseology section for information on proper fuseholder re-rating.

Ordering Information

Catalog Number	Fuse Size
345 101	¼" × 1¼" Fuses
345 121	5 × 20mm Fuses

Body only: 345 101-010
Knob only: 345 101-020 (¼" × 1¼") Grey;
345 121-020 (5 × 20mm) Black.

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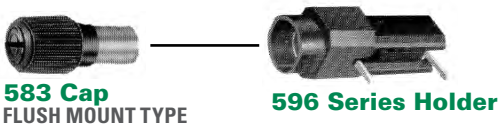
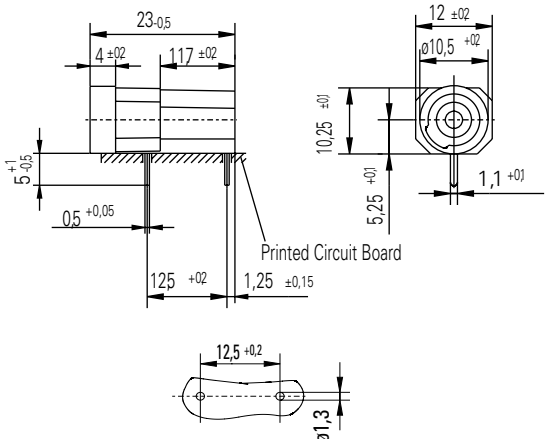
596/583 Series Circuit Board Mount Enclosed Fuse Holders for 5×20mm Fuses

RoHS

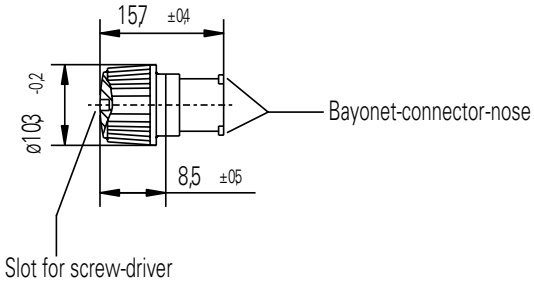


Dimensions

Units in Millimeters



Holes in the Printed Circuit Board



Product Characteristics

Compatible Fuse Types	**5×20mm**
Materials	**Holder:** Duroplastic, black
	Cap: Thermoplastic, UL 94 V-0, black
	Metal Parts: Copper alloy, corrosion protected
	Terminals: Solderable, tinned
Electrical Data (23°C)	**Rated Voltage:** 250V
	Max. Current/Power: 6.3 A / 2.0 W
Mounting	(2) Solder pins0.5×1.1mm
Protection Class & Category	IP 40 (IEC 60529)
Operating Temperature	-25 °C to 70 °C
Stock Conditions	10 °C to 60 °C
Contact Resistance	≤ 5mΩ
Dielectric Strength	3 kV, 50Hz, 1 min., dry
Insulation Resistance	> 10 MΩ (500 V DC, 1 min.)
Solderability	235 °C, 3 sec. (Wave) 350 °C, 1 sec. (Soldering Iron)
Soldering Heat Resistance	260 °C, 5 sec.
Minimum Cross Section	Conductor - 0.2mm²
Marking	596, 250 V
Unit Weight	2,2 g (596) / 1,7 g (583)

Note: 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

Ordering Information

Description	Ordering Number	Packaging
Cap, 5×20 mm	58300000005	Bulk 100
596 Series Holder	59600000005	Bulk 100

Additional Information

Datasheet | **Resources** | **Samples**

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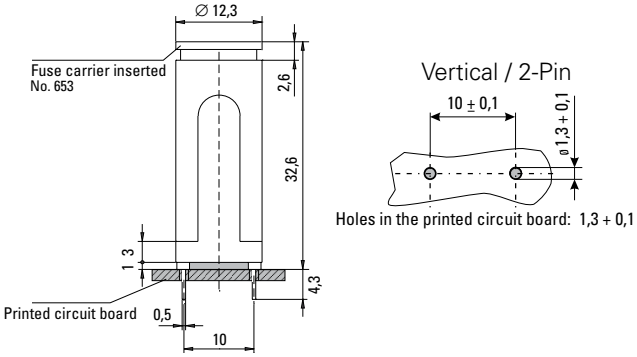
652 Series Circuit Board Mount Enclosed Fuse Holders for 5×20mm Fuses

Not for new designs - refer to No. 852 and 853

Dimensions



Agency Approval

Agency	Agency File Number
VDE	92599 (IP 40 Only)
UL	E70164
CSA	47574

Additional Information

Datasheet | Resources | Samples

Product Characteristics

Compatible Fuse Types	**5×20mm**
Materials	**Holder/Cap:** Black Thermoplastic, UL94 V-0
	Sealing Washer: Thermoplastic (Cap 653 04 & 655 04)
	Metal Parts: Copper alloy, corrosion protected
	Terminals: Solderable tinned
Electrical Data (23°C)	**Rated Voltage:** 250V
	Max. Current/Power: 6.3A (VDE) 16A (UL/CSA)
	Rated Power: 2.5W (VDE)
Mounting	(2) Solder pins 0.5mm×1.1mm
Protection Class & Category	IP 40 (with Cap 653 07 & 655 07 acc. to IEC 60529) IP 54 (with Cap 653 04 & 655 04 acc. to IEC 60529) PC2 (IEC 60127-6)
Operating Temperature	-25°C to +70°C
Climatic Test	-25°C/+70°C/21 days (IEC 60068-2-1...3)
Stock Conditions	+10°C to +60°C relative humidity ≤ 75% yearly average, without dew, maximum value for 30 days - 95%
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration
Contact Resistance	≤ 5mΩ
Dielectric Strength	> 1.5 kV
Impulse Voltage	4 kV, 50 Hz, 1 min., dry
Insulation Resistance	> 10^3 MΩ (500 VDC, 1 min.)
Solderability	235°C, 3 sec. (Wave) 350°C, 1 sec. (Soldering Iron)
Soldering Heat Resistance	260°C, 5 sec. (IEC 60068-2-20)
Minimum Cross Section	Conducting path - 0.2mm²
Marking	652, 250V, Approvals
Unit Weight	3.8g (Holder) / 2.0g (653) / 2.4g (655)

Ordering Information

Description	Ordering Number	Packaging
Cap, 5x20 mm, Flush Mount	653 0000 0705	Bulk 100
Cap, 5x25 mm, Finger Grip	655 0000 0705	Bulk 100
Cap, 5x20 mm, Flush Mount Sealing Washer	653 0000 0405	Bulk 100
Cap, 5x25 mm, Finger Grip	655 0000 0405	Bulk 100
Holder Series	652 0000 0405	Bulk 100

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345 Series Shock-Safe Panel Mount Enclosed Fuse Holders

Product Characteristics

Compatible Fuses	**For 3AB, 3AG, 5×20mm, or 2AG Fuses**
Description	Designed to eliminate the possibility of electrical shock, as defined in IEC standards 60127-6. The universal fuseholder body will accept 3AB, 3AG, 5 × 20mm, and 2AG fuse sizes depending on knob selected. Permits inventory reduction of bodies and provides knob interchange versatility. Anti-tease feature eliminates circuit interruption when knob is accidentally depressed. Five fuseholder types assure design flexibility. Available with two knob styles — screwdriver slot or fingergrip. Available in two terminal styles — dual-purpose for soldering or 3/16" NEMA quick connect; and ¼" NEMA/DIN quick connect. Quick fuse size identification is provided with letters on fingergrip knob and color-coded screwdriver slot knobs.
Electrical	Insulation Resistance: 10,000 megohm minimum at 500 VDC. Contact Resistance: Less than .005 ohm average at currents up to 1 ampere.
Mounting	Threaded styles withstand 15 in.-lb. mounting torque. Low profile and High profile panel thickness: .032" min./.310" max. Quick mount panel thickness: .012" min./.360" max. Rear mount panel thickness: .012" min./.260" max.
Molded Parts	Body Material: Black glass-filled thermoplastic (UL 94V0).
Knob Material	Grey, blue or black glass-filled thermoplastic (UL94 V-0) Hex Nut Material: Black glass-filled thermoplastic.
Knob	Finger-Grip, Fuse Extractor type or Screwdriver Slot, Fuse Extractor type with plated copper alloy insert. Plated copper alloy contact clips. Spring loaded, locking mechanism provides an anti-tease feature and will not vibrate loose.
Terminals	Copper alloy. Tin-plated. Three styles available. A .187" dual purpose terminal accepts wire for soldering or a Quick-Connect receptacle. .187" terminal for NEMA Quick-Connect and .250" terminal for NEMA/DIN Quick-Connect available.
Ambient Temperature	–40°C to +85°C.
Hardware	Threaded style fuseholders are supplied with a thermoplastic hex nut unassembled. Quick mount style fuseholders are supplied with a push-on type retaining nut, black oxide finish, unassembled. A synthetic rubber "O" ring will be supplied only with the screwdriver slot knob when the drip-proof version is requested. To order with a metal internal tooth lockwasher (L) and/or neoprene panel washer (N) and/or drip-proof synthetic rubber "O" ring with Neoprene washer (NP) [Screwdriver slot knob only], add the appropriate suffix (L, N, or NP) respectively (or in combination) to the catalog number.

* Please refer to Fuseology section for information on proper fuseholder re-rating.

Additional Information

Datasheet | **Resources** | **Samples**

Agency Approval

Agency	Agency File Number	3AG/AB	5×20mm	2AG
	E14721	20A 250V	10A 250V	10A 250V
	7316	20A 250V	10A 250V	10A 250V
	40001642	10A 250V	10A 250V	—

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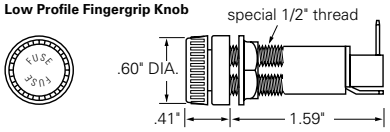
Cartridge Fuse Holders

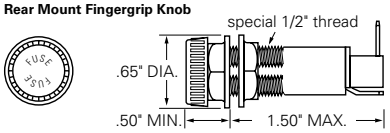
Enclosed Fuseholders > Panel Mounted

Dimensions

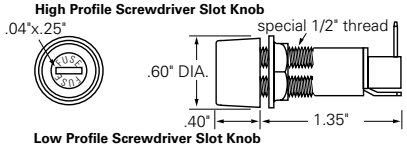
Low Profile Fingergrip Knob



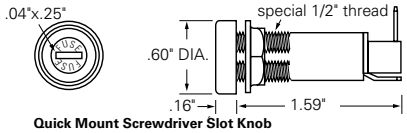
Rear Mount Fingergrip Knob



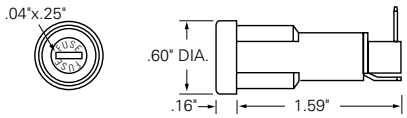
High Profile Screwdriver Slot Knob



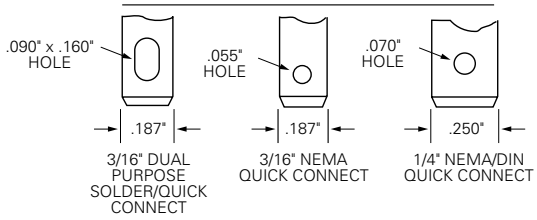
Low Profile Screwdriver Slot Knob



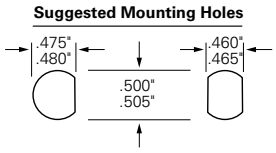
Quick Mount Screwdriver Slot Knob



Terminal Styles

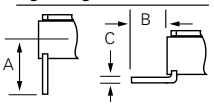


Suggested Mounting Holes



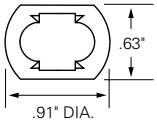
Bottom Terminal

Right Angle **Straight**

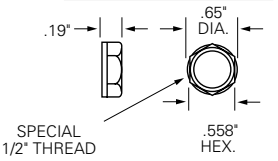


	A	B	C
.187" QC	.53"	.30"	.020"
.250" QC	.59"	.36"	.032"

"Push-On" Type Retaining Nut for Quick Mount Fuseholder



Plastic Hex Nut with Flange



Part Numbering System

EXAMPLE:
(Complete Assembly with Options)

Series Number 345 3 LS 7 L N P

Fuse Size	Style	Terminals	Options*
2 2AG .177" x .570"	LF Low Profile Body Black Fingergrip Knob	1 3/16" (Rt. Angle) Dual Purpose Solder/QC	L Lockwasher
3 3AG .250" x 1.250"	RF Rear Mount Body Black Fingergrip Knob	2 3/16" (Straight) Dual Purpose Solder/QC	N Neoprene Washer
5 5 x 20mm .197" x .787"	HS High Profile Body Screwdriver Slot Knob	3 3/16" (Rt. Angle) NEMA QC	P Drip-Proof "O" Ring** with Neoprene Washer
	LS Low Profile Body Screwdriver Slot Knob	4 3/16" (Straight) NEMA QC	
	QS Quick Mount Body Screwdriver Slot Knob	7 1/4" (Rt. Angle) NEMA/DIN QC	
	Screwdriver Slot Knob 2AG — Blue Knob 3AG — Grey Knob 5 x 20mm — Black Knob	8 1/4" (Straight) NEMA/DIN QC	

*Options (L, N, P) can be ordered individually or in combination.

**Screwdriver slot knob only.

To Order Knob Only:

Fuse Size	Fingergrip Knob	Screwdriver Slot Knob
2AG	**3452LF1-020**	**3452LS1-020**
3AG	**3453LF1-020**	**3453LS1-020**
5 x 20mm	**3455LF1-020**	**3455LS1-020**

To Order Body Including Nut(s) Only:

Terminal Style	Bottom Terminal	Low Profile Body Part Number***	High Profile Body Part Number	Rear Mount Body Part Number	Quick Mount Body Part Number
3/16" Dual Purpose	(Rt. Angle)	**3453LF1-010**	**3453HS1-010**	**3453RF1-010**	**3453QS1-010**
3/16" Dual Purpose	(Straight)	**3453LF2-010**	**3453HS2-010**	**3453RF2-010**	**3453QS2-010**
3/16" NEMA QC	(Rt. Angle)	**3453LF3-010**	**3453HS3-010**	**3453RF3-010**	**3453QS3-010**
3/16"NEMA QC	(Straight)	**3453LF4-010**	**3453HS4-010**	**3453RF4-010**	**3453QS4-010**
¼" NEMA/DIN QC	(Rt. Angle)	**3453LF7-010**	**3453HS7-010**	**3453RF7-010**	**3453QS7-010**
¼"NEMA/DIN QC	(Straight)	**3453LF8-010**	**3453HS8-010**	**3453RF8-010**	**3453QS8-010**

***Low Profile Body will accept either Fingergrip or Screwdriver Slot Knob.

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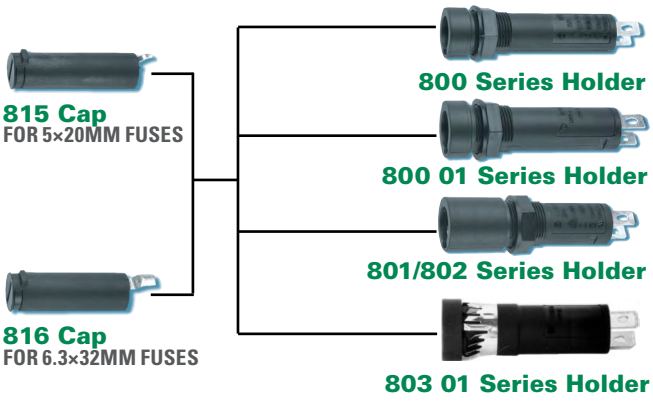
800/801/802/803 Series Panel Mount Enclosed Fuse Holders



Agency Approval

Agency	Agency File Number				Agency Approvals
VDE	122016	123336	120629	6914	121076 (802 only)
UL	E70164	E70164	E70164	E70164	
CSA	47574	47574	47574	47574	

Additional Information

Datasheet 800 Series	Resources 800 Series	Samples 800 Series
Datasheet 801 Series	Resources 801 Series	Samples 801 Series
Datasheet 802 Series	Resources 802 Series	Samples 802 Series
Datasheet 803 Series	Resources 803 Series	Samples 803 Series

Product Characteristics

Series:	800	800 01	801/802	803 01
Compatible Fuses	5×20mm 6.3×32mm	6.3×32mm	5×20mm 6.3×32mm	6.3×32mm
Materials	**Holder/Cap:** Black Thermoplastic, UL94 V-0			
				Clamp spring: non-corrosion metal, untreated
	Metal Parts: Copper alloy, corrosion protected			
	Terminals: Solderable, tinned			
Electrical Data (23°C)	**Rated Voltage:** 250V	**Rated Voltage:** 250V	**Rated Voltage:** 250V	**Rated Voltage:** 500V
	Rated Current: 6.3A (800+815 - VDE) 10A (800+816 - VDE) 16A (UL/CSA)	**Rated Current:** 10A (800+816 - VDE) 16A (UL/CSA)	**Rated Current:** 6.3 A (VDE) with cap 815 10 A (VDE) with cap 816	**Rated Current:** 10 A (VDE) 16 A (UL CSA)
	Rated Power: 2.5W (VDE)			**Rated Power:** 4W (VDE)
Mounting	12.7mm diameter D-hole or double D-hole Admissible torque on plastic hex nut is 1.2Nm			Pluggable with clamping spring in 12.7mm diameter D-hole (panel of 0.75mm - 3 mm)
Terminals	Solderable or 4.8mm quick connect-fits 0.5mm tab			
Protection Category	IP 40 (IEC 60529) PC2 (IEC 60127-6)			
Operating Temperature	-25°C to +70°C			
Climatic Test	-25°C/+70°C/21 days (IEC 60068-2-1...3)			
Stock Conditions	+10°C to +60°C relative humidity ≤ 75% yearly average, without dew, maximum value for 30 days - 95%			
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration			NA
Contact Resistance	≤ 5mΩ			
Dielectric Strength	> 1.5 kV			
Impulse Voltage	4 kV, 50 Hz, 1 min., dry			
Insulation Resistance	> 10^3 MΩ (500 VDC, 1 min.)			
Solderability	235°C, 3 sec. (Wave) 350°C, 1 sec. (Soldering Iron)		235°C, 2 sec. (Wave) 350°C, 1 sec. (Soldering Iron)	235°C, 2 sec. (Wave) 350 °C, 3 sec. (Soldering Iron)
Solder Heat Resistance	260°C, 5 sec. (IEC 60068-2-20)			
Min. Cross Section	Conductor - 2.5mm²			
Marking	800, 250V, Approvals	800 01, 250V, Approvals	Series, 250V, Approvals	803, 500V, Approvals
Unit Weight	4.7g (Holder) 2.5g (Cap)		5.0g (801/802) 2.5g (815/816)	4.9g (803) 2.0g (816)

Ordering Information

Holders	800 0000 0005	800 0000 0105	801 0000 0005 802 0000 0005	803 0000 0105
Caps	For 5×20mm fuse: **815 0000 0005** For 6.3×32mm fuse **816 0000 0005**			
Packaging	Bulk 100 Pcs all items listed above			

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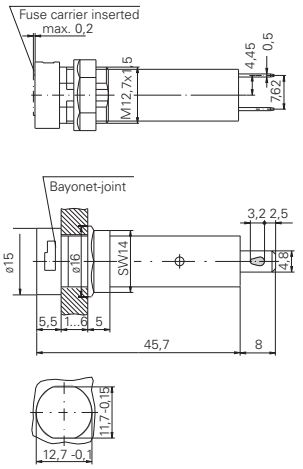
Cartridge Fuse Holders

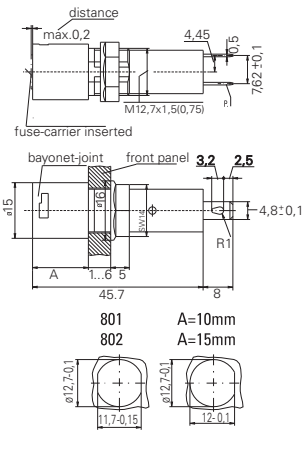
Enclosed Fuseholders > Panel Mounted

Dimensions (millimeters)

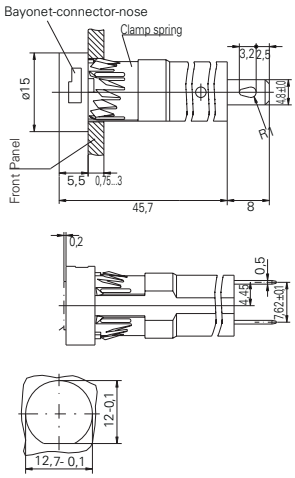
800 Series



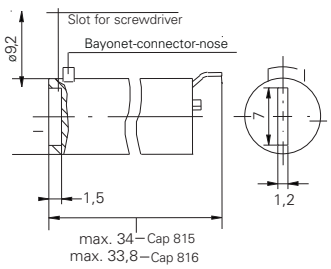
801/802 Series



803 01 Series



815/816 Cap



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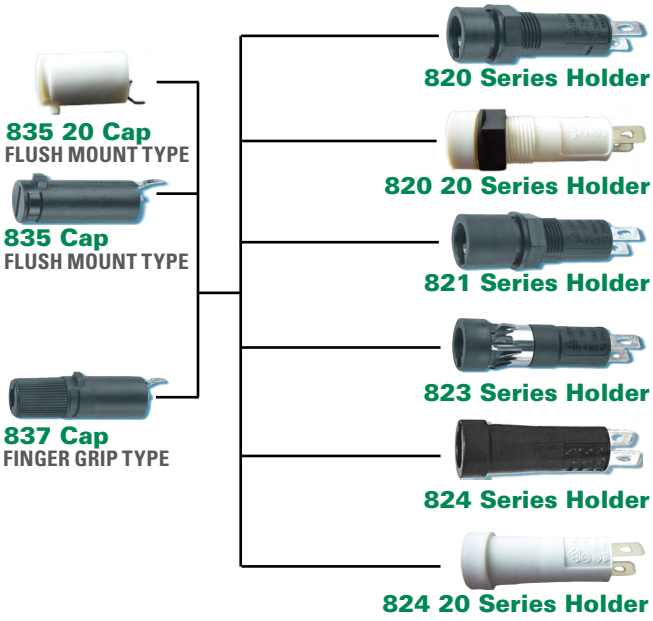
820/821/823/824 Series Panel Mount Enclosed Fuse Holders

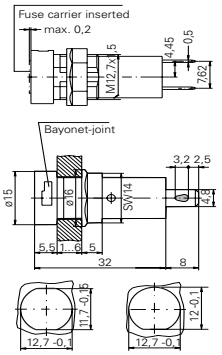


Additional Information

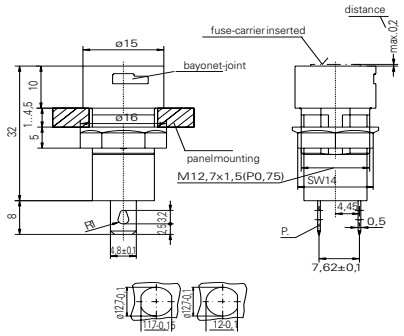
Datasheet 820 Series	Resources 820 Series	Samples 820 Series
Datasheet 821 Series	Resources 821 Series	Samples 821 Series
Datasheet 823 Series	Resources 823 Series	Samples 823 Series
Datasheet 824 Series	Resources 824 Series	Samples 824 Series

Dimensions 820

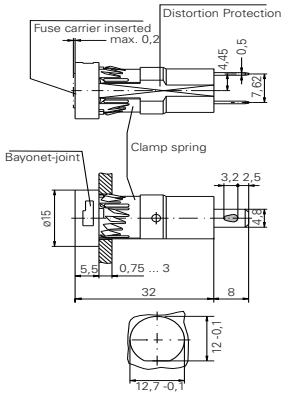
820 Series



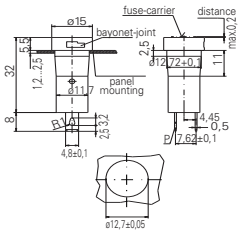
821 Series



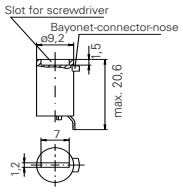
823 Series



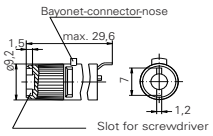
824 Series



835 Cap



837 Cap



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Revised: 03/03/17

Cartridge Fuse Holders

Enclosed Fuseholders > Panel Mounted

Product Characteristics

	820 Series	820 20 Series	821 Series	823 Series	824 Series	824 20 Series
Compatible Fuses	5x20mm	5x20mm	5x20mm	5x20mm	5x20mm	5x20mm
Materials	**Holder/Cap:** Black Thermoplastic UL 94 V-0	**Holder/Cap:** White Thermoplastic PBT, UL94 V-0 **Nut:**Thermoplastics, black, UL94 V-0	**Holder/Cap:** Thermoplastic black, UL94 V-0	**Holder/Cap:** Black Thermoplastic UL94 V-0	**Holder/Cap:** Thermoplastic UL 94V-0, black	**Holder/Cap:** Thermoplastic UL94 V-0, white
	Metal Parts: Copper alloy, corrosion protected					
				Clamp Spring: Spring steel, non-treated		
	Terminals: Solderable, tinned					
Electrical Data (23°C)	**Rated Voltage:** 250V					
	Rated Current: 6.3A (VDE) 16A (UL/CSA)					
	Rated Power: 2.5 W (VDE)	**Rated Power:** 2.5 W (VDE)	**Rated Power:** 2.5 W (VDE)	**Rated Power:** 4 W (VDE)		**Rated Power:** 4 W
Mounting	12.7mm diameter D-hole or double D-hole Admissible torque on plastic hex nut is 1.2Nm		12.7mm diameter D-hole or double D-hole (panel 1mm - 4.5mm) Admissible torque on plastic hex nut is 1.2Nm	Pluggable with clamping spring into 12.7mm diameter D-hole (panel thickness 0.75mm-3mm)	Pluggable (panel thickness 1.2 mm-2.5 mm)	
Terminals	Solderable or 4.8mm quick connect-fits 0.5mm tab					
Protection Category	IP 40 (IEC 60529) PC2 (IEC 60127-6)					
Operating Temperature	-25°C to +70°C					
Climatic Test	-25 °C/+70 °C/21 days (IEC 60068-2-1...3)					
Stock Conditions	+10°C to +60°C relative humidity ≤ 75% yearly average, without dew, maximum value for 30 days - 95%					
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6)10 - 60Hz at 0.75mm amplitude 60 - 2000Hz at 10g acceleration					
Contact Resistance	≤ 5mΩ					
Dielectric Strength	> 1.5 kV					
Impulse Voltage	4kV, 50Hz, 1min, dry	4kV with 1,2µs/50µs		4kV, 50Hz, 1 min., dry		
Insulation Resistance	> 10^3 MΩ (500 VDC, 1 min.)					
Solderability	235°C, 3 sec (Wave) 350°C, 1 sec. (Solder Iron)	235°C, 2 sec. (Solder Bath) (IEC 60068-2-20) 350°C, 3 sec. (Solder Iron) (IEC 60068-2-20)		235°C, 3 sec. (Wave) 350°C, 1 sec. (Soldering Iron)		
Soldering Heat Resist	260°C, 5 sec. (IEC 60068-2-20)					
Min. Cross Section	Conductor - 2.5mm²					
Marking	820, 250 V, Approvals		821, 250V, Approvals	823, 250V, Approvals	824, 250V, Approvals	
Unit Weight	4.0g (Holder) / 1.6g (835) / 2.2g (837)	4.0 g (820) / 1.6 g (835)	4.0g (821) / 1.6g (835) / 2.2g (837)	3.8g (Holder) / 1.6g (835) / 2.2g (837)	3.3g (824) / 1.6g (835) / 2.2g (837)	3.3g (824) / 1.6g (835) / 2.2g (837)
Agency Approval						
Agency	**Agency File Number**					
VDE	132225	125183	135536	122096	122098	
UL	E 70164	E70164	E70164	E 70164	E70164	E70164
CSA	47574	47574	47574	47574	47574	47574
Ordering Information						
Ordering Number: Holders	**820 0000 0005**	**820 0000 0205**	**821 0000 0005**	**823 0000 0005**	**824 0000 0005**	**824 0000 0205**
Ordering Number: Caps	Flush Mount Type: **835 0000 0005 / 835 0000 0205** Finger Grip Type **837 0000 0005**					
Packaging	Bulk 100 Pcs all items listed above					

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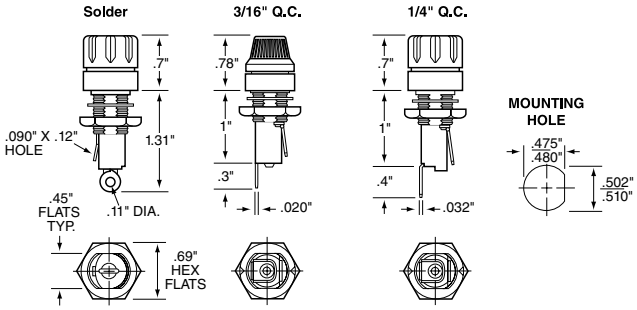
Revised: 03/03/17

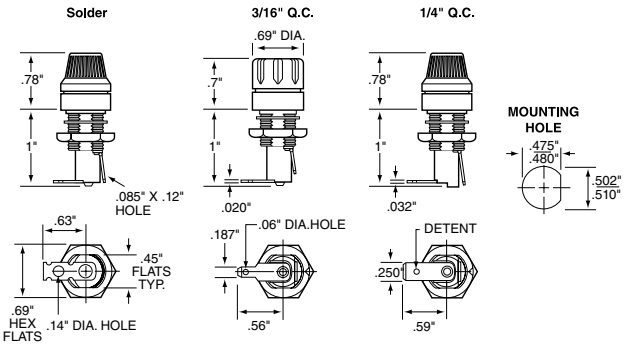
342 Series Panel Mount Enclosed Fuse Holders for 3AG/AB Fuses

Dimensions

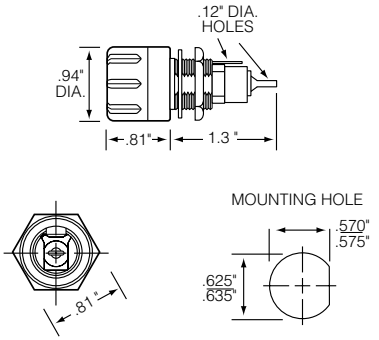
General Application / Straight Terminal Product Dimensions



General Application / Right Angle Terminal Product Dimensions



Watertight Product Dimensions



Product Characteristics

	General Application Products	Watertight Product
Compatible Fuses	3AG/AB	
Electrical	Rated at 20 amperes for any voltage up to 250.	
Ambient Temperature	–40°C to +85°C.	
Dielectric Strength	2400 volts minimum.	1500 volts minimum.
Mounting	Withstands 15 lb.-in. mounting torque; maximum panel thickness: .187".	Withstands 15 lb.-in. mounting torque; maximum panel thickness is .250".
Molded Parts	Black thermoplastic (UL94 V-0).	Black thermoset (UL94 V-0).
Seal	Neoprene washer provide drip-proof protection on the front side of the panel (upon request)	O-ring provides a watertight seal on the front side of the panel per MIL-PRF-19207.
Terminals	Copper & copper alloy. Tin plated, except ¼" Quick-Connect terminals are nickel plated.	Copper & copper alloy. Tin plated.
Hardware	Comes with a mounting nut and neoprene washer	O-rings (2) and hex nut, unassembled.

Agency Approvals

Agency	Agency File Number
UL	E14721
CSA	7316 (*Except 342 006)

Ordering Information

Body Terminal Type		Catalog Number	
Angle	Connect	Fluted Knob	Knurled Knob
General Application Products:			
Straight	Solder	**342 014**	**342 012**
	3/16" Q.C.	**342 038**	**342 058**
	1/4" Q.C.	**342 838**	**342 858**
Right Angle	Solder	**342 004**	**342 022**
	3/16" Q.C.	**342 028**	**342 048**
	1/4" Q.C.	**342 828**	**342 848**
Watertight Product:			
Straight	Solder	**342 006** *	Not Applicable

NOTE: Ensure that proper fuse re-rating is factored in fuseholder selection.

Additional Information

Datasheet | Resources | Samples

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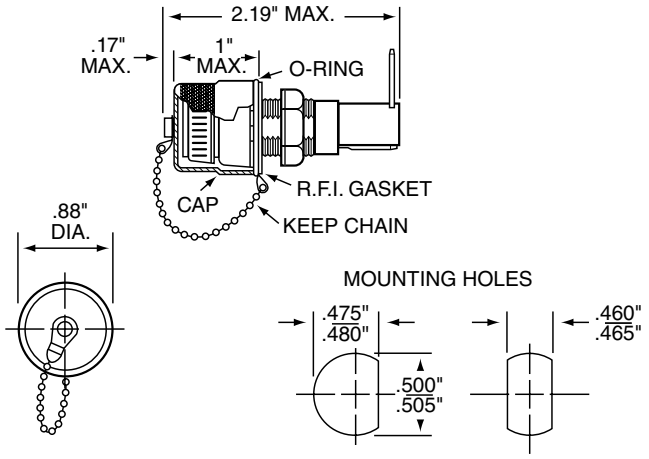
Revised: 03/03/17

340 Series RF Shielded / Watertight Panel Mount Fuse Holders for 3AB/3AG Fuses

Dimensions



Additional Information

Datasheet | Resources | Samples

Product Characteristics

Compatible Fuses	**For 3AG and 3AB Fuses**
Description	Radio frequency shielded fuseholders eliminate possible transmission or reception of RF signals through the hole in the chassis in which the fuseholder is mounted. These fuseholders comply with the watertight construction requirement of MIL-PRF-19207 and the Shock-Safe requirements of IEC 60127-6. A rubber O-ring and conductive gasket maintain RF shielding and watertight construction.
Electrical	Rated at 20 amperes for any voltage up to 300 volts.
Ambient Temperature	–40°C to +85°C.
Dielectric Strength	4000 volts minimum.
Insulation Resistance	10,000 meghom minimum at 500 V.
Contact Resistance	Less than .005 ohms average at currents up to 1 amp.
Mounting	Withstand 15 Lb-in mounting torque. Maximum panel thickness is 0.31"
Molded Parts	Body material: Thermoplastic
Knob Material	Thermoplastic
Terminals	Brass. Tin plated, accept solder or .187" female connector.

* Ensure that proper fuse re-rating is factored in fuseholder selection.

Agency Approvals

Agency	Agency File Number
	7316

Ordering Information

Catalog Number	Brass Shielding Cap Finish
340 312	Nickel plated
340 313	Dull Black

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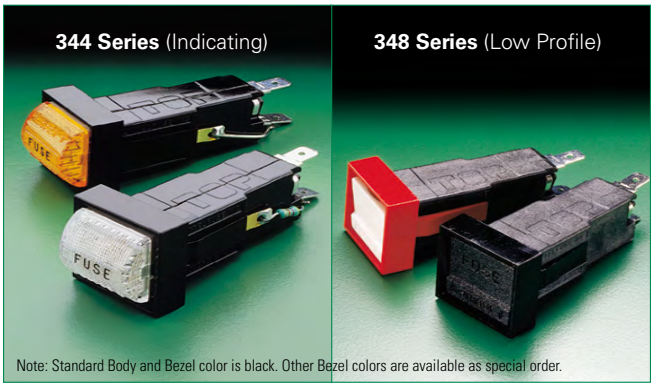
344/348 Series Blown Fuse Indicating / Low Profile Holders for 3AB/3AG Fuses

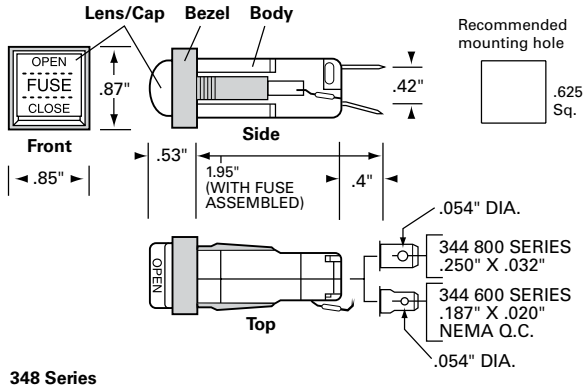
RoHS



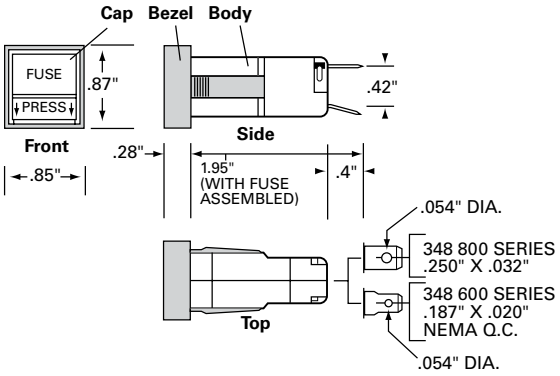
Note: Standard Body and Bezel color is black. Other Bezel colors are available as special order.

Dimensions

344 Series



348 Series



Additional Information

Datasheet 344 Series	**Resources 344 Series**	**Samples 344 Series**
Datasheet 348 Series	**Resources 348 Series**	**Samples 348 Series**

Product Characteristics

Compatible Fuses	For 3AB/3AG Type Fuses
Features	Low profile design Blown fuse indicator
Electrical	348 Series: Rated at 15 amps for any voltage up to 250 volts. 344 Series: Rated at 15 amps at lamp voltage shown below.
Dielectric Strength	1500 volts minimum. When designing indicating type fuseholders into a circuit, consideration should be given to the resistance of fractional amperage fuses and the parallel resistance of the indicator lamp and its resistor.
Mounting	Panel thickness range: .031" through .125".
Molded Parts	Black thermoplastic body (UL94 V-0). Thermoplastic bezel, cap and lens (UL94 V-2). See tables below for colors.
Terminals	Brass. Tin-plated.
Ambient Temperature	Non-indicating: –40°C to +85°C. Indicating: –40°C to +60°C.
Fuse Installation	Insert a fuse into the cap and push the assembly into the body until it latches. Press in and down to unlatch for removal.

NOTE: Ensure that proper re-rating is factored in fuseholder selection.

Ordering Information

Catalog Number		Lamp Type	Lamp Voltage	Lamp Current	Resistor	Lens Color
3/16" Q.C. Terminals	1/4" Q.C. Terminals					
344 601	**344 801**	Incandescent	6	40 ma	No	Amber
344 602	**344 802**	Incandescent	14	80 ma	No	Amber
344 603	**344 803**	Incandescent	28	40 ma	No	Amber
344 604	**344 804**	Neon	120	1.2 ma	Yes	Clear
344 605	**344 805**	Neon	240	.3 ma	Yes	Clear

NOTE:
Standard Body and Bezel color is black. Other Bezel colors may be available as special order.
Please contact Littelfuse for additional information and detailed arrangements.

Catalog Number		Bezel Color	Cap Color
3/16" Q.C. Terminals	1/4" Q.C. Terminals		
348 671	**348 871**	Black	Red
348 677	**348 877**	Black	Black

NOTE:
Standard Body and Bezel color is black. Other Bezel and Cap colors may be available as special order.
Please contact Littelfuse for additional information and arrangments.

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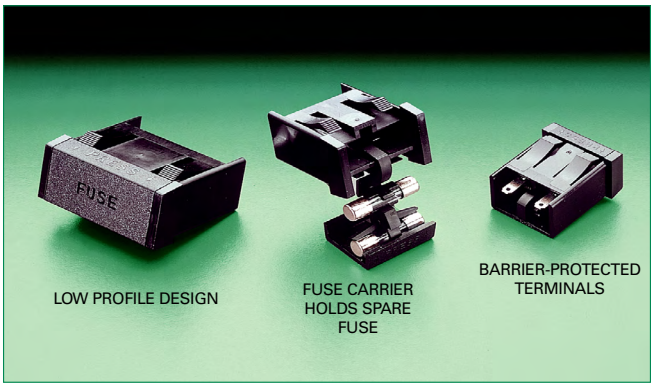
Revised: 03/03/17

286/346 Series Flip-Top Shock-Safe Panel Mount Fuse Holders

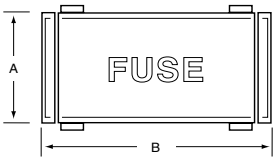


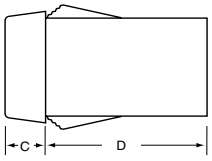
Agency Approvals

Agency	Agency File Number
	E14721
	7316

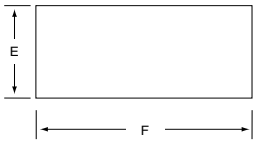
* Ensure that proper fuse re-rating is factored in fuseholder selection.

Dimensions





Recomended Mounting Hole



Product Characteristics

Compatible Fuses	**For 3AG, 3AB, 5×20mm, or 2AG Fuses**
Features	• Shock-Safe design eliminates any possibility of electrical shock, per IEC Standards IEC 60127-6. • Fuse carrier holds spare fuse for fast, easy fuse replacement and convenient servicing. • Low profile design
Electrical	Rating: See TABLE. Insulation Resistance:10,000 megohm minimum at 500 VDC. Contact Resistance: Less than 0.01 ohm.
Mounting	Snap-in mounting. No hardware required. Panel thickness range: .032″ through .125″.
Molded Parts	Thermoplastic (UL94 V-0) black standard (other colors available as special).
Fuse Carrier	Spring-loaded. Unlocks with a press of the finger. Locks into place to prevent accidental circuit interruption. Permanently attached to fuseholder body to prevent loss. Extracts fuse from live terminals. Holds spare fuse.
Terminals	Copper alloy, tin plate. Accepts quick-connect or solder.
Ambient Temperature	–40°C to +85°C.
Vibration	10-55-10 Hz at .06″ double amplitude (Method 201, MIL-STD-202).

Additional Information

Datasheet 286 Series
Resources 286 Series
Samples 286 Series
Datasheet 346 Series
Resources 346 Series
Samples 346 Series

Ordering Information

Catalog Number	Fuse Size	Q.C. Terminals	Max. Amps At 250V.	A	B	C	D	E +.005″/-.000″	F +.005″/-.000″
346 877	3AG	.250″ × .032″ .072″ Dia. Hole	15	.75″	1.5″	.27″	1.04″	.688″	1.445″
286 677	5 × 20mm	.187″ × .032″ .055″ Dia. Hole	10	.70″	1.03″	.26″	.94″	.625″	.953″
286 377	2AG	.110″ × .020″ .048″ Dia. Hole	10	.61″	.85″	.20″	.87″	.550″	.775″

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Revised: 03/03/17

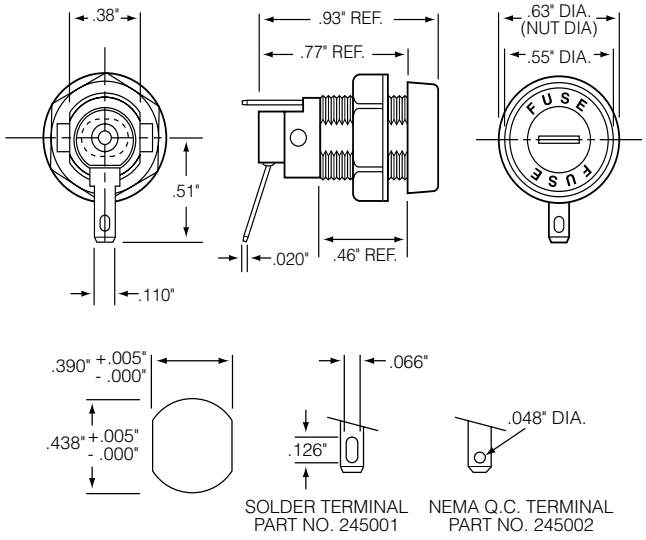
Cartridge Fuse Holders

Enclosed Fuseholders > Panel Mounted

Littelfuse
Expertise Applied | Answers Delivered

245 Series Shock-Safe Fuse Holders for 2AG Fuses

Dimensions



MOUNTING HOLE **TERMINAL DETAIL**

Product Characteristics

Compatible Fuse Size	**225 Series, 229 Series, 2200029 Series**
Features	Screwdriver slot knob style provides low profile Shock-safe design reduces possibility of electrical shock.
Electrical	Rated at 10 amperes for any voltage up to 300 volts. Insulation Resistance: 10,000 megohm minimum at 500 VDC. Contact Resistance: Less than .005 ohm average at currents up to 1 ampere.
Dielectric Strength	4000 volts terminal to panel, 3000 volts terminal to terminal. Mounting: Withstands 10 lb.-in. mounting torque. Maximum panel thickness is 250".
Molded Parts	Body, knob, and hex nut material: Black, glass reinforced thermoplastic.
Knob	Screwdriver slot, fuse extractor type with nickel-plated, beryllium copper insert. Stainless steel spring.
Terminals	Brass. Tin-plated. Solder/Q.C. Terminals accept soldered wire or a .110" quick-connect receptacle. The NEMA-style .110" Q.C. terminal has a .048" hole.
Ambient Temperature	–40°C to +85°C.

Agency Approvals

Agency	Agency File Number
	E14721
	7316

Additional Information

Datasheet **Resources** **Samples**

Ordering Information

Ordering Number	Catalog Number	Type of Terminal	Packaging
02450001H	245001	Solder/Q.C. Terminal	Bulk 100 pieces
02450001X	245001	Solder/Q.C. Terminal	Bulk 100 pieces
02450002H	245002	NEMA Q.C. Terminal	Bulk 100 pieces
02450002X	245002	NEMA Q.C. Terminal	Bulk 100 pieces

Note: Part number 02450002 can be supplied with lockwasher or neoprene washer, or both.

Add to the end of part number a "L" for lockwasher and "N" for neophrene washer or "LN" for both.

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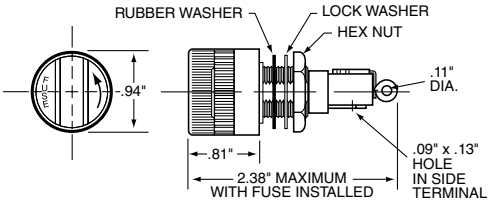
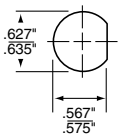
344 Series Blown Fuse Indicating Holders for 3AG and 3AB Fuses

Dimensions

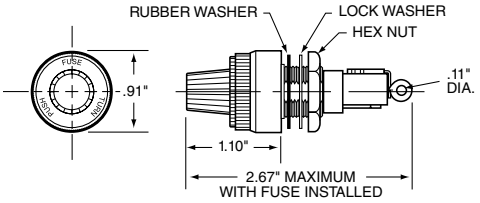
344 000 Series



Mounting Hole



344 400 Series



Additional Information

Datasheet | **Resources** | **Samples**

Product Characteristics

Compatible Fuses	**3AG** **3AB**
Electrical	Rated at 20 amperes at lamp voltage shown below. Dielectric: withstanding voltage exceeds 1500 volts. All fuseholders are supplied with a resistor. When designing indicating type fuseholders into a circuit, consideration should be given to the resistance of fractional amperage fuses and the parallel resistance of the indicator lamp and 7its resistor.
Mounting	Withstands 15 lb.-in. mounting torque. Maximum panel thickness is .250".
Molded Parts	Black Body and knob are thermoset (UL94 V-0), except lens is thermoplastic (UL 94HB). See Table below for lens color.
Knob	Bayonet style.
Terminals	Copper & copper alloy. Tin plated.
Ambient Temperature	–40°C to +85°C.
Hardware	Neoprene washer, lockwasher & hex nut unassembled. O-ring option available must be ordered separately using part number 901-108.

* Ensure that proper re-rating is factored in fuseholder selection.

Agency Approvals

Agency	Agency File Number
	E14721

Ordering Information

Catalog Number		Voltage Range	Lamp Type Rating	Lamp Current Rear Panel	Lens Color
344 000 Series (Bar Knob)	344 400 Series (Round Knob)				
344 006	**344 401**	2.5 to 7	6V Incandescent	.20 amp	Amber
344 012	**344 402**	7 to 16	14V Incandescent	.08 amp	Amber
344 024	**344 403**	16 to 32	28V Incandescent	.04 amp	Amber
344 125	**344 404**	100 to 125	Neon	.002 amp	Clear
344 250	**344 405**	200 to 250	Neon	.002 amp	Clear

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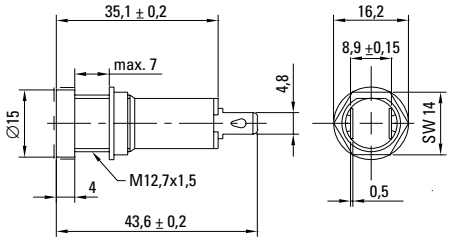
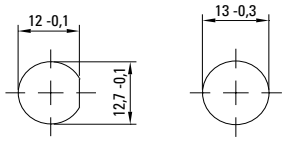
870 Series Medical Grade Shock-Safe Holder for 5×20mm Fuses

Dimensions 870



Includes Captive Cap



Panel alternatives

Additional Information

Datasheet | **Resources** | **Samples**

Product Characteristics 870

Compatible Fuses	**For Shocksafe, Medical Grade, 5×20mm fuses**
Materials	**Holder/Cap:** Black Thermoplastic, UL 94V0
	Metal Parts: Copper alloy, corrosion protected
	Terminals: Solderable, tinned
Electrical Data (23°C)	**Rated Voltage:** 250V
	Rated Current: 10A
	Rated Power: 2.5W (VDE)
Mounting	12.7mm diameter D-hole or 13mm round hole Admissible torque on plastic hex nut is 1.2Nm
Terminals	Solderable or 4.8mm quick connect-fits 0.5mm tab
Protection Class & Category	IP 40 (IEC 60529) PC3 (IEC 60127-6) Live parts are fully inaccessible to a 1mm diameter probe
Operating Temperature	-40°C to +85°C
Climatic Test	-40°C/+85°C/21 days (IEC 60068-2-1...3)
Stock Conditions	0°C to 60°C, max. 70% R.H.
Contact Resistance	≤ 5mΩ at 20 mV
Impulse Voltage	4 kV, 50Hz, 1 min., dry
Insulation Resistance	> 10^3 MΩ (500VDC, 1 min.)
Solderability	350°C, 2 sec. acc. to IEC 60068-2-20, Test Ta method 2
Soldering Heat Resistance	350°C, 10 sec. (IEC 60068-2-20) acc. to IEC 60068-2-20, Test Tb, method 2
Minimum Cross Section	Conductor - 2.5mm²
Marking	870, 250V, Approvals
Unit Weight	5.6g

* Ensure that proper fuse re-rating is factored in fuseholder selection.

Agency Approvals

Agency	Agency File Number
VDE	40003282
UL	E70164

Ordering Information

Ordering Number	Packaging
870 0000 1009	Bulk 100 Pcs

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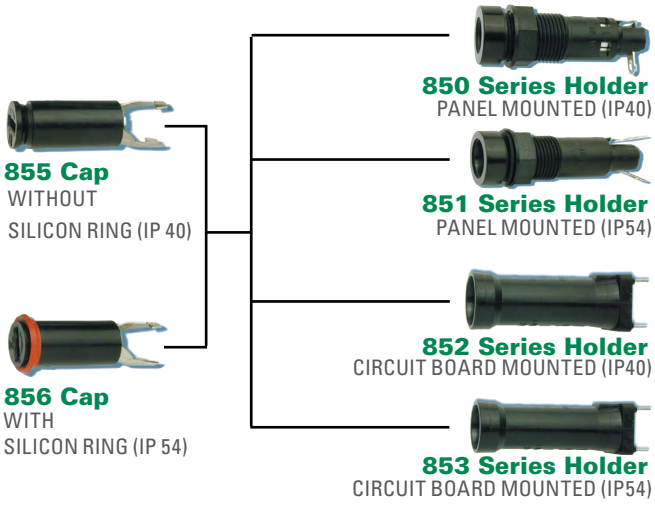
850/851/852/853 Series Enclosed Fuse Holders for 5×20mm Fuses



Agency Approval

Agency	Agency File Number
VDE	850 and 851 - 40034355 852 and 853 - 40033885
UL	E70164

Additional Information

Datasheet 850 Series	Resources 850 Series	Samples 850 Series
Datasheet 851 Series	Resources 851 Series	Samples 851 Series
Datasheet 852 Series	Resources 852 Series	Samples 852 Series
Datasheet 853 Series	Resources 853 Series	Samples 853 Series

Product Characteristics

	850/851 Series	852/853 Series
Compatible Fuse	**5×20mm**	
Materials	**Holder:** Black Thermoplastic **Cap:** Black Thermoplastic Both UL94VO	**Holder/Cap:** Black Thermoplastic, UL 94V0
	Sealing Ring: Silicon (Cap 856)	
	Metal Parts: Copper alloy, corrosion protected	
	Terminals: Solderable tinned	
Electrical Data (23ºC)	**Rated Voltage:** 250V	
	Rated Current: 10 A	**Rated Current:** 6.3A (VDE) 12A (UL)
	Rated Power: 4W (VDE)	**Rated Power:** 2W (VDE)
Mounting	12.7mm diameter D-hole or 13mm round hole Admissible torque on plastic hex nut is 1.2Nm	(2) Solder pins 0.5mm×1.1mm
Terminals	Solderable only, 4mm×0.5mm (850) Solderable or 2.8mm quick connect - fits 0.5mm tab (851)	
Protection Class & Category	IP 40 (with Cap 855 acc. to IEC 60529) IP 54 (with Cap 856 acc. to IEC 60529) PC2 (IEC 60127-6)	
Operating Temp.	-40ºC to +85ºC	
Climatic Test	-40ºC/+85ºC/21 days (IEC 60068-2-1...3)	
Stock Conditions	0°C to 60°C, Max 70% R.H.	
Contact Resistance	≤ 5mΩ at 20mV	
Impulse Voltage	4 kV, 50Hz, 1 min., dry	
Insulation Resistance	> 10^3 MΩ (500VDC, 1 min.)	
Solderability	350°C/2 sec. acc to IEC 60068-2-20, Test Ta, method 2	235°C/2 sec. acc to IEC 60068-2-20, Test Tb, method 1
Soldering Heat Resistance	350°C/10 sec. acc to IEC 60068-2-20, Test Tb. method 2	260°C/10 sec. acc to IEC 60068-2-20, Test Tb, method 1A
Minimum Cross Section	Conductor - 1.5mm²	Conducting path - 0.2mm²
Marking	Part No., 250V, Approvals	
Unit Weight	4.1g (850) / 1.8g (855) 4.2g (851) / 1.9g (856)	3.2g (852) / 1.8g (855) 3.2g (853) / 1.9g (856)

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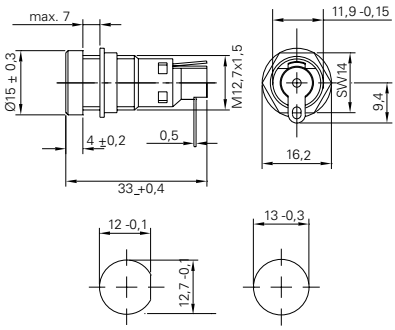
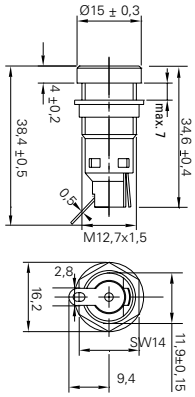
Dimensions

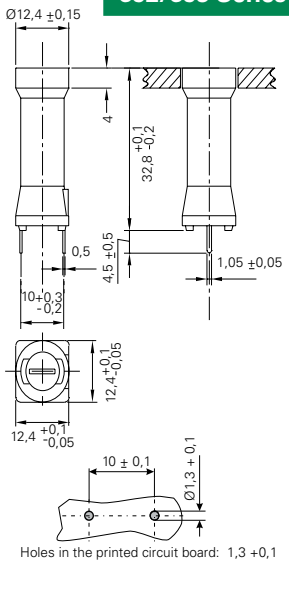
850 Series



851 Series

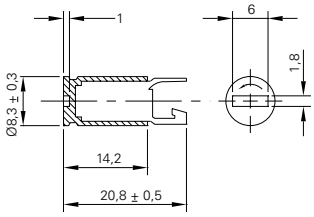


852/853 Series

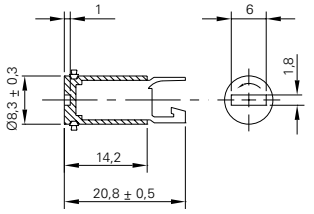


Holes in the printed circuit board: 1,3 +0,1

855 Cap



856 Cap



Ordering Information

Description	Ordering Number	Packaging
Cap, w/out ring (IP40)	855 0000 1009	Bulk 100
Cap, w/silicon ring (IP54)	856 0000 1009	Bulk 100
850 Series Holder (IP40)	850 0000 1009	Bulk 100
851 Series Holder (IP54)	851 0000 1009	Bulk 100
852 Series Holder (IP40)	852 0000 1009	Bulk 100
853 Series Holder (IP54)	853 0000 1009	Bulk 100

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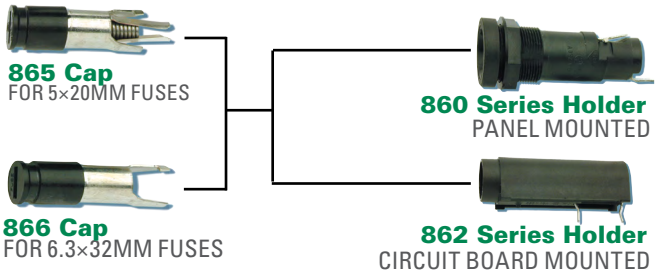
860/862 Series Enclosed Fuse Holders for 5×20mm and 6.2x32mm Fuses



Agency Approval

Agency	Agency File Number	
	860 Series	862 Series
VDE	40003287	136720 UG
UL	E70164	E70164

Additional Information

Datasheet 860 Series
Resources 860 Series
Samples 860 Series
Datasheet 862 Series
Resources 862 Series
Samples 862 Series

Product Characteristics

	860 Series	862 Series
Compatible Fuses	**5x20mm** **6.3x32mm**	
Materials	**Holder/Cap:** Black Thermoplastic, UL 94V0	
	Metal Parts: Copper alloy, corrosion protected	
	Terminals: Solderable tinned	
Electrical Data (23°C)	**Rated Voltage:** 250V	
	Rated Current: 10A (VDE) 16A (CSA) 20A (UL)	**Rated Current:** 10A (VDE) 16A (UL/CSA)
	Rated Power: 4.0W (VDE)	**Rated Power:** 862/865: 2.5W (VDE) 862/866: 3.2W (VDE)
Mounting	12.7mm diameter D-hole or double D-hole Admissible torque on plastic hex nut is 1.2Nm	(2) Solder pins 0.5mm×1.1mm and plastic stud Pins are kicked for optimal soldering
Terminals	Solderable or 4.8mm quick connect-fits 0.5mm tab	Solderable tinned
Protection Class & Category	IP 40 (IEC 60529) PC2 (IEC 60127-6)	IP 40 (IEC 60529) PC2 (IEC 60127-6)
Operating Temperature	-40°C to +85°C	
Climatic Test	-40°C/+85°C/21 days (IEC 60068-2-1...3)	
Stock Conditions	+10°C to +60°C relative humidity ≤ 75% yearly average, without dew, maximum value for 30 days - 95%	
Vibration Resistance	24 cycles at 15 min. each (IEC 60068-2-6) 10 - 60Hz at 0.75mm amplitude 60 - 500Hz at 10g acceleration	
Contact Resistance	≤ 5mΩ	
Impulse Voltage	4 kV, 50Hz, 1 min., dry	
Insulation Resistance	> 10^3 MΩ (500VDC, 1 min.)	
Solderability	235°C, 2 sec. (Wave) 350°C, 1 sec. (Soldering Iron)	
Soldering Heat Resistance	350°C, 5 sec. (IEC 60068-2-20)	
Minimum Cross Section	Conductor - 2.5mm²	Conducting path - 0.2mm²
Marking	860, 250V, Approvals	862, 250V, Approvals
Unit Weight	5.3g (860) / 5.6g (862) / 3.3g (865) / 2.5g (866)	

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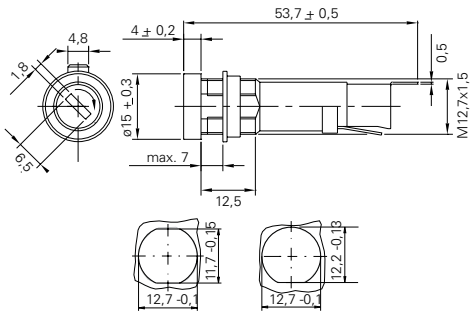
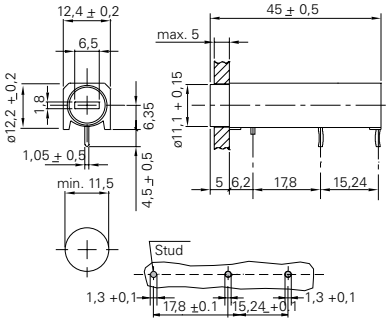
Dimensions

860 Series

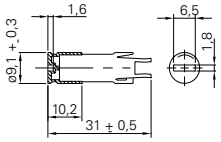


862 Series

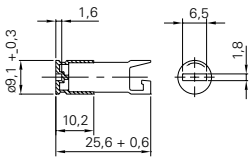


Holes in the printed circuit board: 1,3 +0,1

865 Cap



866 Cap



Ordering Information

Description	Ordering Number	Packaging
Cap, 5×20 mm	865 0000 1009	Bulk 100
Cap, 2x25 mm	866 0000 1009	Bulk 100
860 Series Holder	860 0000 1009	Bulk 100
862 Series Holder	862 0000 1009	Bulk 100
865 Series Holder	865 0000 1009	Bulk 100
866 Series Holder	866 0000 1009	Bulk 100

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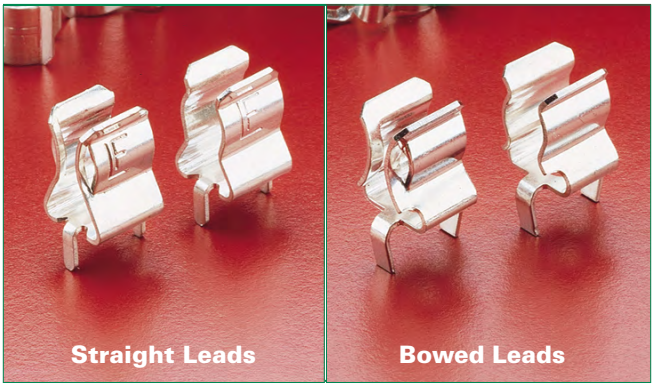
Cartridge Fuse Clips

102/122 Series Circuit Board Mount Fuse Clips for 1/4" Diameter Fuses



Agency Approval

Agency	Agency File Number	
	102 Series	122 Series
	E14721	

Additional Information

Datasheet 102 Series

Resources 102 Series

Samples 102 Series

Datasheet 122 Series

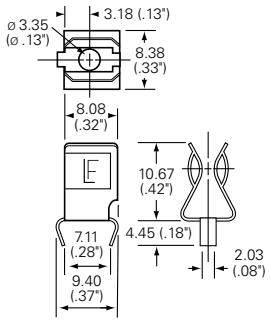
Resources 122 Series

Samples 122 Series

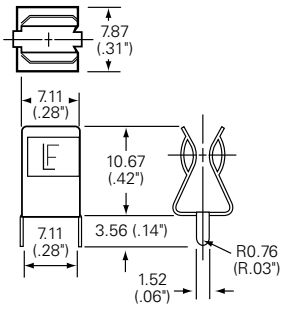
Product Characteristics

	102 Series	122 Series
Compatible Fuse Size	**1/4" Diameter Fuses 312, 313, 314, 326, 505, 506, 508 Series**	
Current Level	15 amperes max	30 amperes max

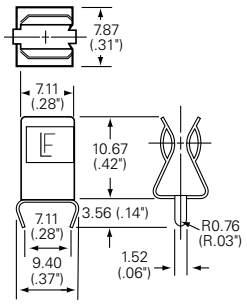
Product Dimensions



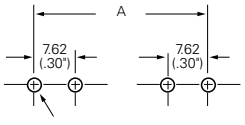
Bowed Leads for 102 series



Straight Leads



Bowed Leads for 122 series



Recommended Mounting Dimensions

Nominal Fuse Length	"A" Length
5/8	.750
3/4	.875
7/8	1.000
1	1.125
1 1/16	1.187
1 1/4	1.347
1 7/16	1.562

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Ordering Information

Ordering PN *	Catalog No.	Clip Material	Plating	Style	Packaging Available
Traditional Clips					
0102 0071	102 071	Spring Brass	Tin-plated	Ear	Z
0102 0074	102 074	Spring Brass	Tin-plated	Earless	Z
0102 0076	102 076	Spring Brass	Tin-plated	Ear	Z
0122 0055	122 055	Copper-Nickel Alloy	Tin-plated	Ear	Z
0122 0083	122 083	Beryllium Copper	Silver-plated	Ear	Z
0122 0087	122 087	Beryllium Copper	Silver-plated	Earless	Z
0122 0088	122 088	Beryllium Copper	Tin-plated	Ear	Z
0122 0093	122 093	Beryllium Copper	Tin-plated	Earless	Z
Bowed Tab Clips					
0102 0078	102 078	Spring Brass	Tin-plated	Earless	H and Z
0102 0079	102 079	Spring Brass	Tin-plated	Ear	Z
0122 055Z-1	122 055	Copper-Nickel Alloy	Tin-plated	Ear	Z
0122 088Z-1	122 088	Beryllium Copper	Tin-plated	Ear	Z

***Add Suffix to the Ordering PN for Packaging:**
"H" = std. package 100 pcs per pack
"Z" = for bulk package

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Cartridge Fuse Clips

100/102/122 Series Low Profile Circuit Board Mount Fuse Clips for 1/4" Diameter Fuses

Product Characteristics

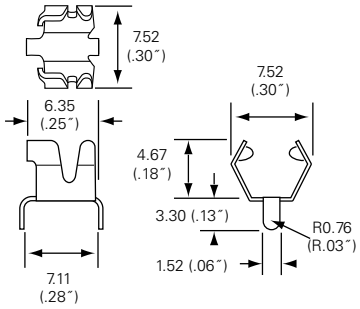
	102 080	122 090	100 058
Compatible Fuse Size	**1/4" Diameter and 6.3mm Fuses**		
Current Level	15 Amps max	30 Amps max	15 Amps max

Agency Approval

Agency	Agency File Number		
	102 080	**122 090**	**100 058**
	E14721		

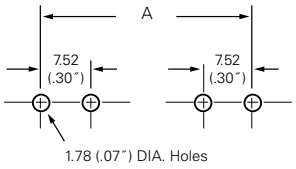
Product Dimensions

102/122 Series



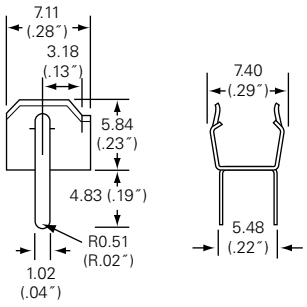
Mounting Dimensions for 102/122 Series

Nominal Fuse Length	"A" Length
5/8	.760
3/4	.880
7/8	1.005
1	1.130
1 1/16	1.195
1 1/4	1.380
1 7/16	1.570



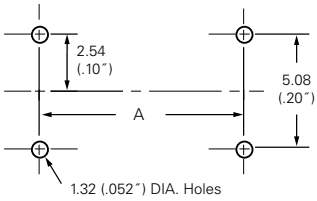
Recommended Mounting Dimensions

100 Series



Mounting Dimensions for 100 Series

Nominal Fuse Length	"A" Length
1	0.781
1 1/14	1.035
1 7/16	1.250



Recommended Mounting Dimensions

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Cartridge Fuse Clips

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Ordering Information

Ordering PN*	Catalog No.	Clip Material	Plating	Style	Packaging Available
0102 0080	102 080	Spring Brass	Tin-plated	Ear	Z
0122 0090	122 090	Beryllium Copper	Silver-plated	Ear	Z
0100 0058	100 058	Spring Brass	Tin-plated	Ear	Z

Add Suffix to the Ordering PN for Packaging
"Z" = for bulk package

Additional Information

Datasheet 100 Series
Resources 100 Series
Samples 100 Series
Datasheet 102 Series
Resources 102 Series
Samples 102 Series
Datasheet 122 Series
Resources 122 Series
Samples 122 Series

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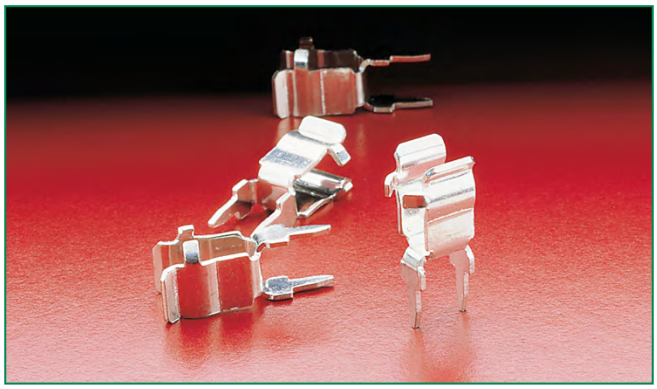
100/445/030/520 Series Circuit Board Mount Fuse Clips for 5mm Diameter Fuses



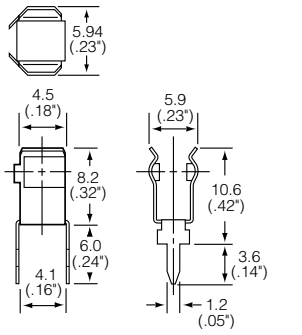
Product Characteristics

	100 054/056 series	100 020 series	445/030/520 series
Compatible Fuse Size	**5mm Diameter Fuses** 213, 215, 216, 217, 218, 219XA, 232, 233, 234, 235, 239, 477 and 977 Series		
Current Level	10 Amp max	20 Amp max	10 Amp max

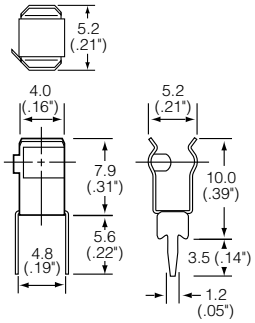
Agency Approval

Agency	Agency File Number			
	100 054/056 series	**445/030 series**	**100 020 series**	**520 series**
c UL us	N/A		N/A	E14721
UL	N/A		E14721	

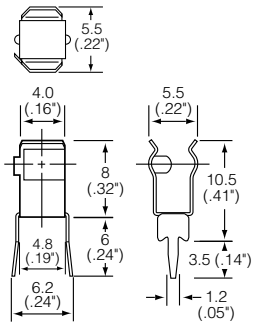
Product Dimensions



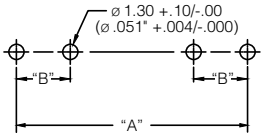
0100 0020 / 0100 0054 / 0100 0056



0445 0001 / 0030 0210



0520 0001



Recommended Mounting Dimensions

Fuse Size	A Dim.
5mm×20mm	20.5 (.807")
5mm×25mm	25.5 (1.004")
5mm×30mm	31.0 (1.220")

Clip Series	B Dim.
100 series	4.60±.05(.181"±.002)
445/030 series	5.20±.05(.205"±.002)
520 series	5.80±.05(.228"±.002)

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Cartridge Fuse Clips

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Ordering Information

Ordering PN	Catalog No.	Clip Material	Plating	Style	Packaging
01000054Z	100 054	Spring Brass	Silver-plated	Ear	2,000 pcs (bulk)
01000056Z	100 056	Spring Brass	Tin-plated	Ear	2,000 pcs (bulk)
01000020Z	100 020	Phosphor Bronze	Tin-plated	Ear	1,000 pcs (bulk)
04450001H	445 001	Spring Brass	Tin-plated	Ear	100 pcs (bulk)
04450001N	445 001	Spring Brass	Tin-plated	Ear	5,000 pcs (bulk)
00300210M	030 210	Spring Brass	Tin-plated	Ear	1,000 pcs
00300210N	030 210	Spring Brass	Tin-plated	Ear	5,000 pcs (bulk)
05200001N	520 001	Spring Brass	Silver-plated	Ear	1,000 pcs (bulk)

Additional Information

Datasheet 100 Series | **Resources 100 Series** | **Samples 100 Series**

Datasheet 445 Series | **Resources 445 Series** | **Samples 445 Series**

Datasheet 030 Series | **Resources 030 Series** | **Samples 030 Series**

Datasheet 520 Series | **Resources 520 Series** | **Samples 520 Series**

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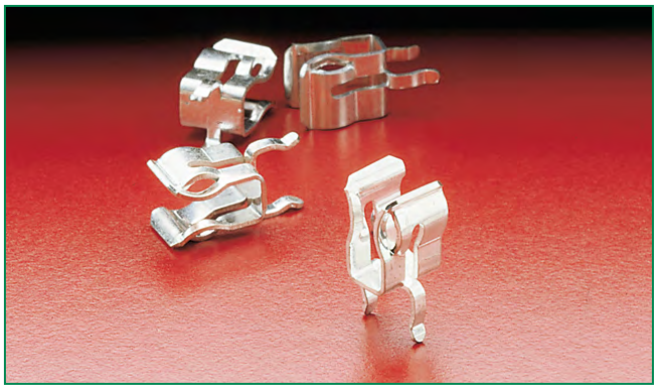
Cartridge Fuse Clips

111 Series Thru-Hole and Surface Mount Holders for 2AG or 4.5-5mm Diameter Fuses



Product Characteristics

	111 501	111 506	111 505
Compatible Fuse Size	**4.5mm~5mm Diameter Fuses**		
Current Level	10 Amps max	10 Amps max	10 Amps max
Mounting	PC	PC	Surface Mount

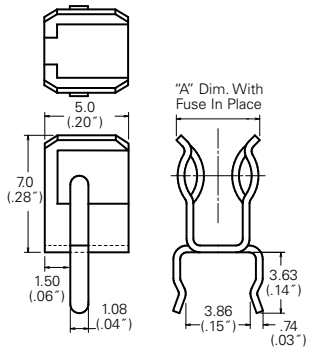
Agency Approval

Agency	Agency File Number		
	111 501	**111 506**	**111 505**
	E14721	N/A	N/A

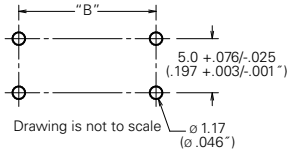
Product Dimensions

Mounting Dimensions for 111 501 / 111 506

Table 1	A Dim.	B Dim.
2AG	.23	.50
5×20	.27	.74



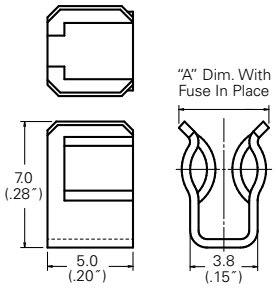
111 501 / 111 506 Device Dimensions



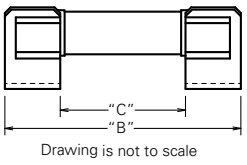
Recommended Mounting Dimensions

Mounting Dimensions for 111 505

Table 1	A Dim.	B Dim.	C Dim.
2AG	.23	.65 max.	.22 min.
5×20	.27	.88 max.	.43 min.



111 505 Device Dimensions



Recommended Mounting Dimensions

Note: Metric dimensions are shown. Inch dimensions are in parentheses.

Ordering Information

Ordering PN*	Catalog No.	Clip Material	Plating	Style	Packaging Available
0111 0501	111 501	Spring Brass	Tin-plated	Ear	Z
0111 0506	111 506	Beryllium Copper	Tin-plated	Ear	Z
0111 0505	111 505	Beryllium Copper	Tin-plated	Ear	Z

Add Suffix to the Ordering PN for Packaging

"Z" = for bulk package

Additional Information

Datasheet | **Resources** | **Samples**

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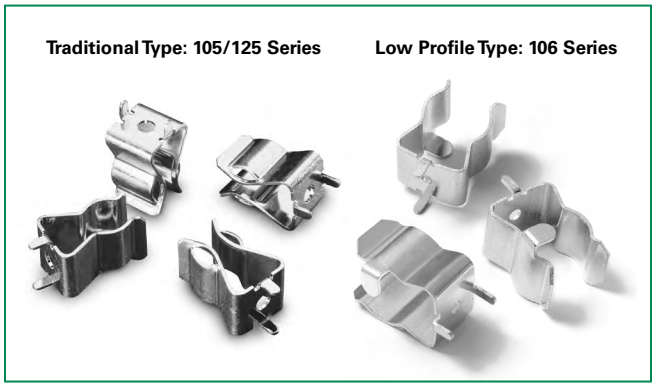
105/106/125 Series Circuit Board Mount Clips for Midget (13/32") Diameter Fuses

RoHS



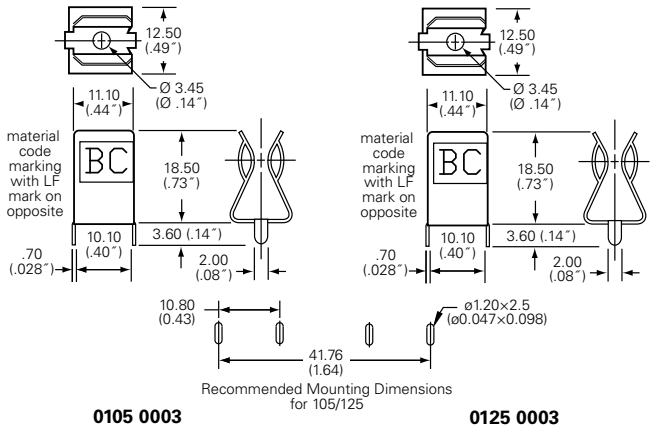
Product Characteristics

	105 Series	125 Series	106 Series
Compatible Fuse Size	**13/32" Diameter Fuses (Midget Type Fuse)**		
Current Levels	15A max	30A max	15A max

Agency Approval

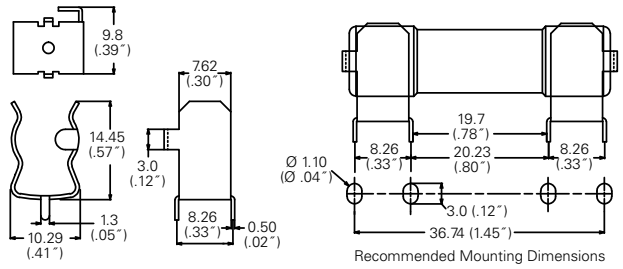
Agency	Agency File Number		
	105 Series	125 Series	106 Series
	E14721		N/A

Product Dimensions



0105 0003
Device Dimensions

0125 0003
Device Dimensions



0106 0001
Device Dimensions

Ordering Information

Ordering No.	Catalog No.	Clip Material*	Plating	Style	Packaging Available
0105 0003	105 003	Spring Brass	Tin-plated	Ear	H
0125 0003	125 003	Beryllium Copper	Tin-plated	Ear	H
0106 0001	106 001	Phosphor Bronze	Tin-plated	Ear	Z

Add Suffix to the Ordering PN for Packaging

"H" = std. package 100 pcs per pack

"Z" = for bulk package

Additional Information

Datasheet 105 Series

Resources 105 Series

Samples 105 Series

Datasheet 106 Series

Datasheet 125 Series

Resources 125 Series

Samples 125 Series

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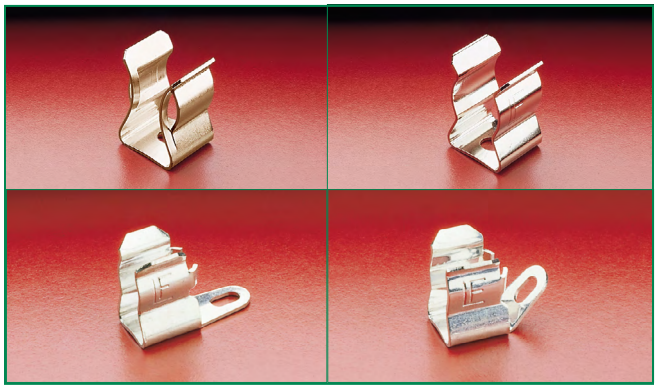
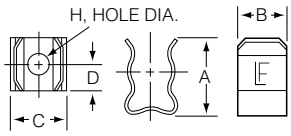
Cartridge Fuse Clips

101/102/105/107/109/121/125/127/129 Series Rivet/Eyelet Mount Fuse Clips for 1/4" - 13/16" Dia. Fuses RoHS

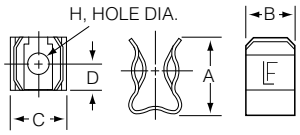


Product Dimensions

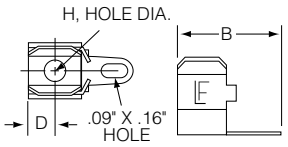
Earless Clip Type
(without fuse stops)



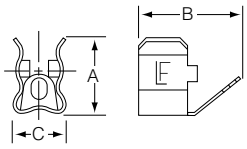
Ear Clip Type
(with fuse stops)



Straight Solder Lug Type



45° Angle Solder Lug Type



Catalog No.	Fuse Diameter	A	B	C	D	H Diameter
101001 101002 121001 121002	1/4"	.48"	.31"	.30"	.16"	.131"
101003 121004		.47"	.56"	.31"	.15"	
102064			NA			
105001 105002	13/32"	.75"	.44"	.52"	.22"	.196"
125001 125002		.74"				
107002 127001 127002	9/16"	.94"	.59"	.65"	.25"	.203"
109001 109002 129001 129002	13/16"	1.31"	.75"	.88"	.31"	.265"

Product Characteristics

	101/102/121 Series	105/125 Series	107/127 Series	109/129 Series
Compatible Fuse Size	1/4" Dia Fuses	13/32" Dia Fuses	9/16" Dia Fuses	13/16" Dia Fuses

Additional Information

Datasheet 101 Series	Resources 101 Series	Samples 101 Series
Datasheet 102 Series	Resources 102 Series	Samples 102 Series
Datasheet 121 Series	Resources 121 Series	Samples 121 Series
Datasheet 105 Series	Resources 105 Series	Samples 105 Series
Datasheet 125 Series	Resources 125 Series	Samples 125 Series
Datasheet 107 Series	Resources 107 Series	Samples 107 Series
Datasheet 127 Series	Resources 127 Series	Samples 127 Series
Datasheet 109 Series	Resources 109 Series	Samples 109 Series
Datasheet 129 Series	Resources 129 Series	Samples 129 Series

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Cartridge Fuse Clips

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Ordering Information

Ordering PN*	Catalog PN	Material	Plating	Style	Current Level	Packaging
0101 0001	101 001	Spring Brass	Nickel-plated	Ear	15A max	Z
0121 0001	121 001	Beryllium Copper	Silver-plated	Ear	30A max	Z
0105 0001	105 001	Spring Brass	Nickel-plated	Ear	15A max	Z
0125 0001	125 001	Beryllium Copper	Silver-plated	Ear	30A max	Z
0127 0001	127 001	Beryllium Copper	Silver-plated	Ear	30A max	Z
0109 0001	109 001	Phos. Bronze	Nickel-plated	Ear	60A max	H or Z
0129 0001	129 001	Beryllium Copper	Silver-plated	Ear	60A max	H or Z
0101 0002	101 002	Spring Brass	Nickel-plated	Earless	15A max	Z
0121 0002	121 002	Beryllium Copper	Silver-plated	Earless	30A max	Z
0105 0002	105 002	Spring Brass	Nickel-plated	Earless	15A max	Z
0125 0002	125 002	Beryllium Copper	Silver-plated	Earless	30A max	Z
0107 0002	107 002	Spring Brass	Nickel-plated	Earless	30A max	Z
0127 0002	127 002	Beryllium Copper	Silver-plated	Earless	30A max	H or Z
0109 0002	109 002	Phos. Bronze	Nickel-plated	Earless	60A max	H or Z
0129 0002	129 002	Beryllium Copper	Silver-plated	Earless	60A max	H or Z
0101 0003	101 003	Spring Brass	Tin-plated	Ear- Solder Lug 45*	15A max	Z
0121 0004	121 004	Beryllium Copper	Silver-plated	Ear- Solder Lug 45*	30A max	H or Z
0102 0064	102 064	Spring Brass	Tin-plated	Ear-Solder Lug Straight	15A max	H or Z

Add Suffix to the Ordering PN for Packaging
"H" =std. package 100 pcs per pack
"Z" =for bulk package

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Cartridge Fuse Clips

520/521/102071 Series Circuit Board Mount Fuse Clips for 5mm & 6.3mm Diameter Fuses

520 Clip

521 Clip
(90° Pin Shift)

102071 Clip

Product Characteristics

	520 Clip	521 Clip	102071 Clip
Compatible Fuse Size	**5mm Diameter**		**6.3mm Diameter**
Electrical Data (23°C)	**Rated Voltage:** 250V		**Rated Voltage:** 500V
	Max. Current/Power: 6.3A/2.5W		**Max. Current/ Power:** 10A/4W
Mounting	PC Board, 5mm pin spacing Solder pins 0.4×1.2mm		PC Board, 7.6 mm pin spacing Solder pins 0.5×1.5 mm
Solderability	245°C maximum, 3 sec. maximum (IEC 60068-2-20)		N/A
Soldering Heat Resistance	260°C, 10 sec. (IEC 60068-2-20)		N/A
Minimum Cross Section	Conducting path - 0.2mm²		
Unit Weight	0.4g		0.9g
UL Agency Approval	N/A	N/A	N/A

Agency Approval

Agency	Agency File Number		
	520 Clip	**521 Clip**	**102071 Clip**
	N/A	N/A	E1472

Ordering Information

Ordering PN	Clip Material	Plating	Packaging Available
52000001009	Phos Bronze	Tin plated	Bulk 2000
52100001009	Phos Bronze	Tin plated	Bulk 2000
10207101009	Brass	Tin plated	Bulk 1000

Additional Information

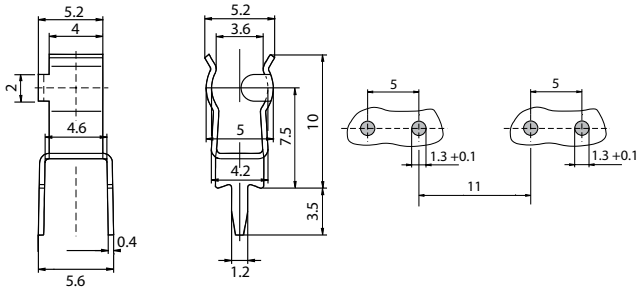
Datasheet 520 Series | **Resources 520 Series** | **Samples 520 Series**

Datasheet 521 Series | **Resources 521 Series** | **Samples 521 Series**

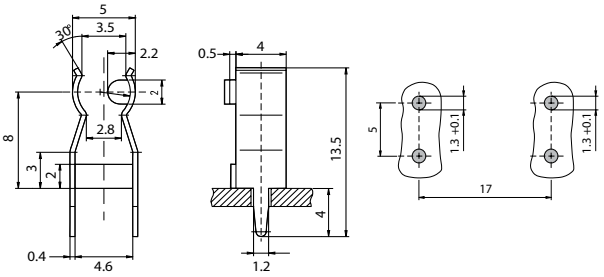
Datasheet 102071 Series | **Resources 102071 Series** | **Samples 102071 Series**

Product Dimensions

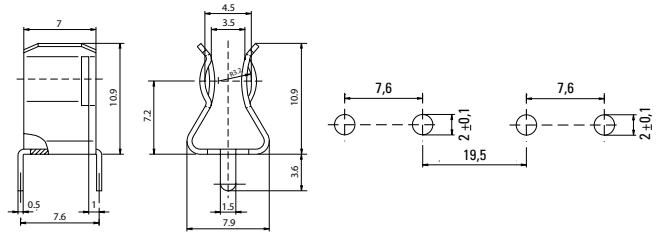
520 Clip



521 Clip



102071 Clip



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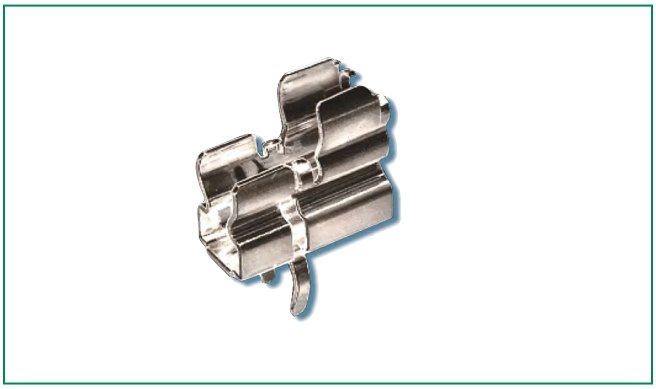
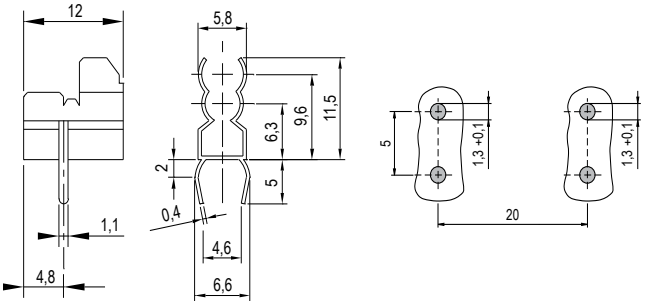
Application testing is strongly recommended. Specifications are subject to change without notice.
Revised: 03/03/17

518 Series Miniature Circuit Board Mount Clip for 5mm / 6.3mm Diameter Fuses



Product Dimensions



Product Characteristics

Compatible Fuses	**For 5mm/6.3mm Fuses**
Materials	**Clip:** Copper alloy Solderable, tinned
Electrical Data (23°C)	**Rated Voltage:** 250V
	Max. Current/Power: 10 A/2.5 W
Mounting	PC Board, 5mm pin spacing Kicked solder pins 0.4×1.1 mm
Minimum Cross Section	Conducting path - 0.2mm²
Unit Weight	0.9g

Agency Approval

Agency	Agency File Number
	E70164

Ordering Information

Ordering PN	Clip Material	Plating	Packaging Available
51800001009	Phosphor Bronze	Tin-plated	Bulk (1000pcs)

Additional Information

Datasheet | **Resources** | **Samples**

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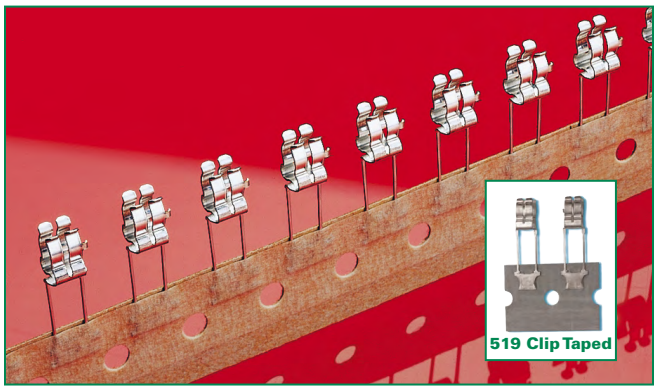
Cartridge Fuse Clips

111/519 Series 5mm Fuse Clips Taped for Automated Insertion

RoHS



Product Characteristics

	111 Series	519 Series
Compatible Fuse Size	**5mm Diameter Fuses**	
Materials	Clip: Copper alloy Solderable, tinned	
Mounting	PC Board, 5mm pin spacing Solder pins 0.3×0.5mm	N/A
Current Level	10 Amps max	2.5 Amps

Ordering Information

Ordering PN	Clip Material	Plating	Style	Packaging Available
51900001009	Phosphor Bronze	Tin-plated	Ear	Tape/Reel (1000pcs)
01110005MR	Phosphor Bronze	Tin-plated	Ear	Ammo Pack 1000 pcs

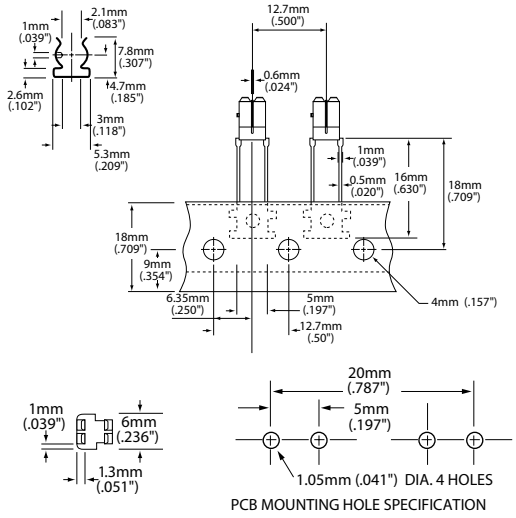
Additional Information

Datasheet 111 Series | **Resources 111 Series** | **Samples 111 Series**

Datasheet 519 Series | **Resources 519 Series** | **Samples 519 Series**

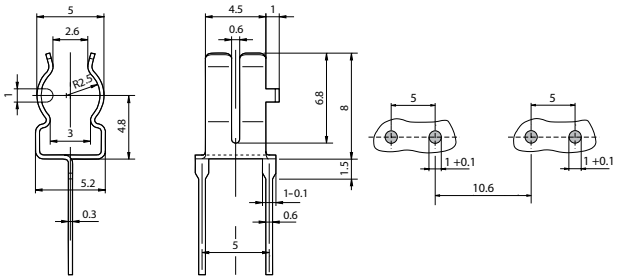
Product Dimensions

111 Series



PCB MOUNTING HOLE SPECIFICATION

519 Clip Taped



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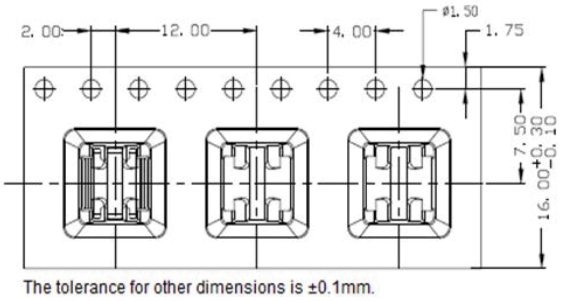
523 Series 5×20mm Fuse Clips for Automated Pick In Place (PIP)

RoHS

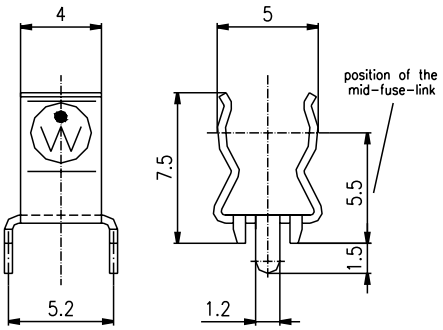
Product Characteristics (For 523 PIP Clip)

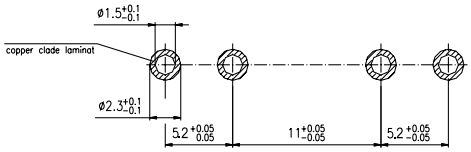
Materials	**Copper alloy Solderable, tinned**
Electrical Data (23°C)	**Rated Voltage:** 250V
	Max. Current/Power: 6.3A/2.5W
Mounting	PC Board, 5,2 mm pin spacing Solder pins 0.4×1.2 mm
Solderability	245°C maximum, 3 sec. maximum (IEC 60068-2-20)
Soldering Heat Resistance	260 °C, 10 s (IEC 60068-2-20)
Minimum Cross Section	Conducting path - 0.2mm²
Unit Weight	0.4g

Product Dimensions



The tolerance for other dimensions is ±0.1mm.





Mounting Dimensions

Ordering Information

Ordering PN	Clip Material	Plating	Packaging Available
5230000S001	Phosphor Bronze	Tin-plated	Tape and reel 800 pcs

Additional Information

Datasheet | **Resources** | **Samples**

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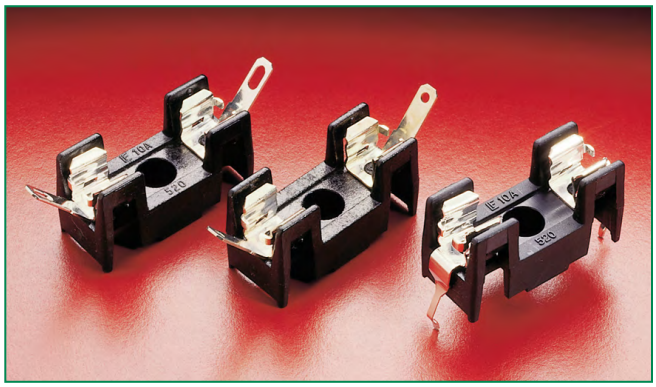
520 Series Metric OMNI-BLOK® Molded Base Fuse Block for 5×20mm Fuses



Agency Approval

Agency	Agency File Number
	E14721
	7316
	97121

Additional Information

Datasheet | Resources | Samples

Product Characteristics

Compatible Fuse Sizes	**5×20mm Fuses**
Description	The metric Omni-Blok® fuse block, for 5×20mm size fuses, is a low profile design that is available with a choice of solder type terminals, NEMA style QC terminals, or PC board mountable terminals. Each of these designs has tin plated brass terminals. A unique design feature provides self-alignment of the clips to the fuse caps. This feature, plus a one-piece clip/terminal design, assures low contact resistance. An anti-one-piece clip/terminal design, assures low contact resistance. An anti rotation feature is also available on the solder and QC terminal designs.
Electrical	UL/CSA VDE Solder Type — 10A, 600V., 6.3A, 250V Q.C. Type — 10A, 600V. 6.3A, 250V PCB Type — 10A, 600V. 6.3A, 250V
Dielectric Strength	1500V., Minimum
Clip/Terminals	Tin-Plated Spring Brass
Base	Glass reinforced Thermoplastic. UL 94V0 flammability rating. Gray color (GY) for anti-rotational series, black color for all others.
Ambient Temperature	–40°C to +85°C

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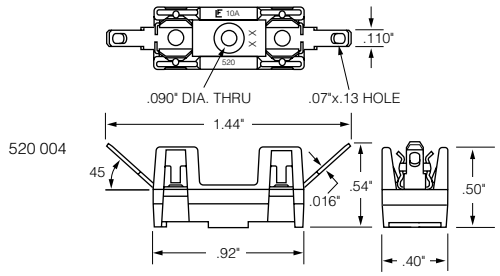
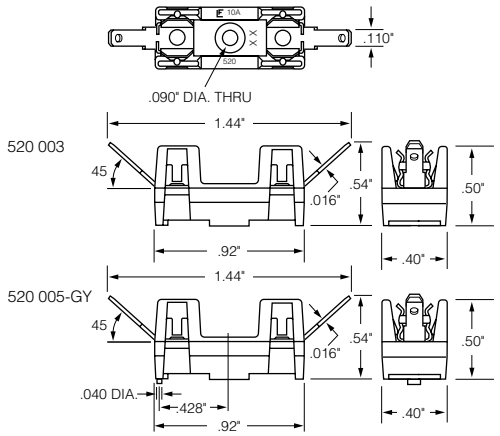
Product Dimensions

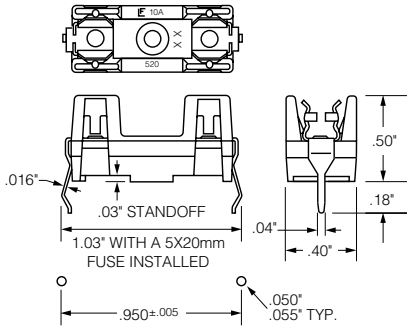
Solder Terminals Type:



Q.C. Terminals Type:



PC Board Mount Type:



RECOMMENDED HOLE PATTERN

Ordering Information

Ordering PN	Part Number	Width (B)	Clip/ Terminal Material	Anti-Rotation Boss
Solder Terminals Type				
0520 0004 Z	520 004	.40"	Brass	No
Q.C. Terminals (NEMA Style .110") Type				
0520 0003 Z	520 003	.40"	Brass	No
0520 0005 ZXGY	520 005 GY	.40"	Brass	Yes
P.C. Board Mount Type				
0520 0101 Z	520 101	.40"	Brass	No

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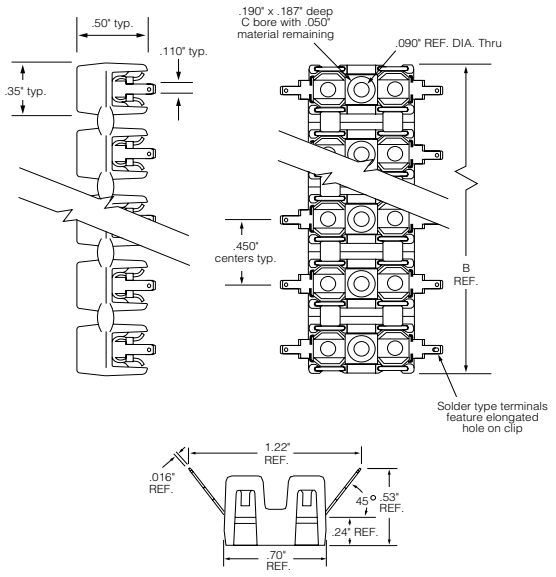
Revised: 03/03/17

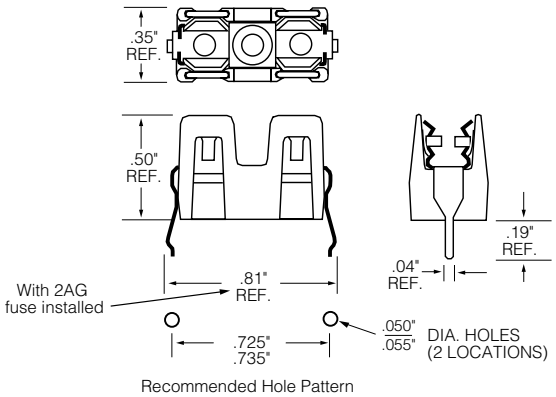
254 Series OMNI-BLOK® Molded Base Fuse Block for 2AG Fuses

Dimensions

Solder & Q.C. Types:



P.C. Board Mount Type



Recommended Hole Pattern

Product Characteristics

Compatible Fuses Size	**2AG**
Description	This low profile Omni-Blok® Fuse Block design is available with a choice of solder type terminals, Q.C. terminals or P.C. board mountable terminals. The PCB design is offered with either tin-plated brass terminals for normal applications or tin-plated beryllium copper terminals for use in caustic environments. These fuse blocks feature individual barriers which reinforce the fuse clips while providing greater protection against clip damage and electrical shock. The unique design permits self-alignment of clips to fuse cap. This, plus a one-piece clip/terminal assures low contact resistance. Multiple units may be broken apart to obtain desired number of units.
Rating	400 VAC/DC / 10A
Dielectric Strength	1500V., Minimum
Clip/Terminals	Tin-Plated Spring Brass, except pn 254121 is Tin-Plated Beryllium Copper
Base	Black Thermoplastic, glass reinforced with UL V0 flammability rating
Ambient Temperature	–40°C to +85°C

Agency Approval

Agency	Agency File Number
	E14721
	7316

OPTIONS:

1. Other colors available on special order. Contact factory.
2. Two different style clips can be supplied for circuit identity or polarization. Contact factory.

Additional Information

Datasheet | **Resources** | **Samples**

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Ordering Information

Ordering NO.*	Catalog NO.	No. of Poles	Width (B)	Clip/Terminal Material	Packaging Available
Solder Type Terminals					
0254 0001Z	254 001	1	0.35"	Brass	Z
0254 0002Z	254 002	2	0.875"	Brass	Z
0254 0003Z	254 003	3	1.31"	Brass	Z
0254 0004Z	254 004	4	1.75"	Brass	Z
0254 0005Z	254 005	5	2.18"	Brass	Z
0254 0006Z	254 006	6	2.62"	Brass	Z
0254 0007Z	254 007	7	3.06"	Brass	Z
0254 0008Z	254 008	8	3.50"	Brass	Z
NEMA Style .110" Q.C. Terminals					
0254 0201Z	254 201	1	0.35"	Brass	Z
0254 0202Z	254 202	2	0.875"	Brass	Z
0254 0203Z	254 203	3	1.31"	Brass	Z
0254 0204Z	254 204	4	1.75"	Brass	Z
0254 0205Z	254 205	5	2.18"	Brass	Z
0254 0206Z	254 206	6	2.62"	Brass	Z
0254 0207Z	254 207	7	3.06"	Brass	Z
0254 0208Z	254 208	8	3.50"	Brass	Z
P.C. Board Mount					
02540101Z	254 101	1	0.35"	Brass	Z
02540121Z	254 121	1	0.35"	Beryllium Copper	Z

Add Suffix:
"Z" =for bulk package

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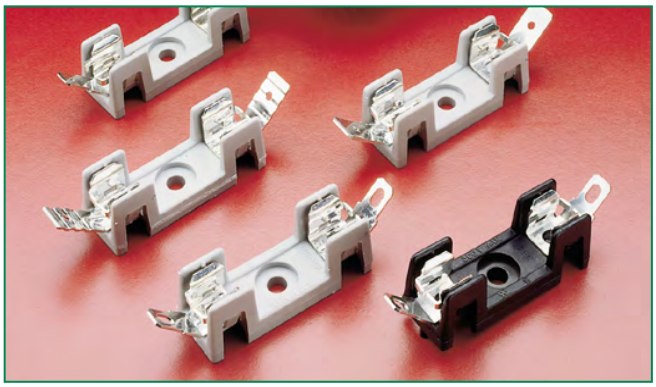
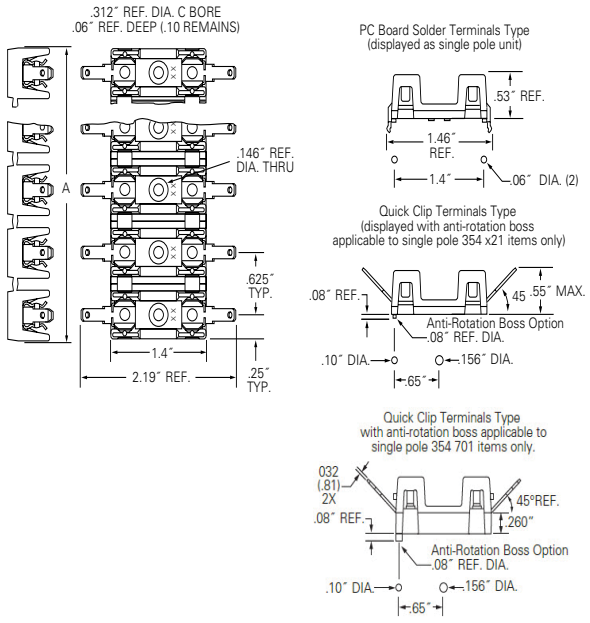
354 Series OMNI-BLOK® Molded Base Fuse Block for 3AB/3AG Fuses



Agency Approval

Agency	Agency File Number
UL	E14721
CSA	7316

Product & Mounting Dimensions



Clip Detail

Solder 3/16″ | Q.C. 1/4″ | Q.C. 1/4″ | P.C. Board

Note: Two different style clips can be supplied for circuit identity or polarization. Contact Littelfuse.

Product Characteristics

Compatible Fuses Size	**3AB/AG**
Description	A low profile fuse block featuring individual barriers which reinforce the fuse clips while providing greater protection against clip damage and electrical shock. The unique design permits self-alignment of clips to fuse cap. This, plus a one-piece clip/terminal assures low contact resistance. Higher currect ratings have been attained using spring brass clips. With the exception of the two-pole unit, multiple pole units may be broken apart to obtain desired number of poles
Dielectric Strength	1500V., Minimum
Clip/Terminals	Tin plated phosphorus bronze except for 354900 series which is tin plated spring brass.
Base	Glass reinforced Thermoplastic. UL 94V0 flammability rating. The standard base color is Gray except for 345 x21 items (single pole products which include anti-rotation boss option) where the standard base color is Black. Refer to the Ordering Information table on the following page for more information.
Ambient Temperature	–40°Cto +85°C

Electrical Information

Series or Catalog Number	Terminals	Rating
354 000	Solder	30A, 600 VDC/VAC*
354 600	3/16″ Q.C.	20A, 600 VDC/VAC
354 700	1/4″ Q.C. .032″ Clip	30A, 600 VDC/VAC
354 800	1/4″ Q.C.	20A, 600 VDC/VAC
354 900	1/4″ Q.C.	30A, 600 VDC/VAC
354 101-GY	P.C. Board	15A, 600 VDC/VAC

*30 amp capability is based on temperature rise with #10 AWG wire properly soldered.

Additional Information

Datasheet | **Resources** | **Samples**

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Ordering Information

Solder Terminals	NEMA Style 3/16" Quick Clip Terminals	1/4" Quick Clip Terminals	NEMA Style 1/4" Quick Clip .032" Terminals	NEMA Style 1/4" Quick Clip Terminals	Number of Poles	Reference Dimension "A
Ordering No.			Ordering No.			
03540101ZXGY	–	–	–	–	1	.50"
03540021ZXBL*	03540621ZXBL*	03540821ZXBL*	–	03540921ZXBL*	1	.50"
03540001ZXGY	03540601ZXGY	03540801ZXGY	03540701ZXGY	03540901ZXGY	1	.50"
03540002ZXGY	03540602ZXGY	03540802ZXGY	–	03540902ZXGY	2	1.12"
03540003ZXGY	03540603ZXGY	03540803ZXGY	–	03540903ZXGY	3	1.75"
03540004ZXGY	03540604ZXGY	03540804ZXGY	–	03540904ZXGY	4	2.38"
03540005ZXGY	03540605ZXGY	03540805ZXGY	–	03540905ZXGY	5	3.00"
03540006ZXGY	03540606ZXGY	03540806ZXGY	–	03540906ZXGY	6	3.63"
03540007ZXGY	03540607ZXGY	03540807ZXGY	–	03540907ZXGY	7	4.25"
03540008ZXGY	03540608ZXGY	03540808ZXGY	–	03540908ZXGY	8	4.88"
03540009ZXGY	03540609ZXGY	03540809ZXGY	–	03540909ZXGY	9	5.50"
03540010ZXGY	03540610ZXGY	03540810ZXGY	–	03540910ZXGY	10	6.13"
03540011ZXGY	03540611ZXGY	03540811ZXGY	–	03540911ZXGY	11	6.75"
03540012ZXGY	03540612ZXGY	03540812ZXGY	–	03540912ZXGY	12	7.38"

* With Anti-Rotation Boss

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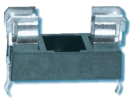
646 Series Molded Base Fuse Block For 5×20mm Fuses

RoHS

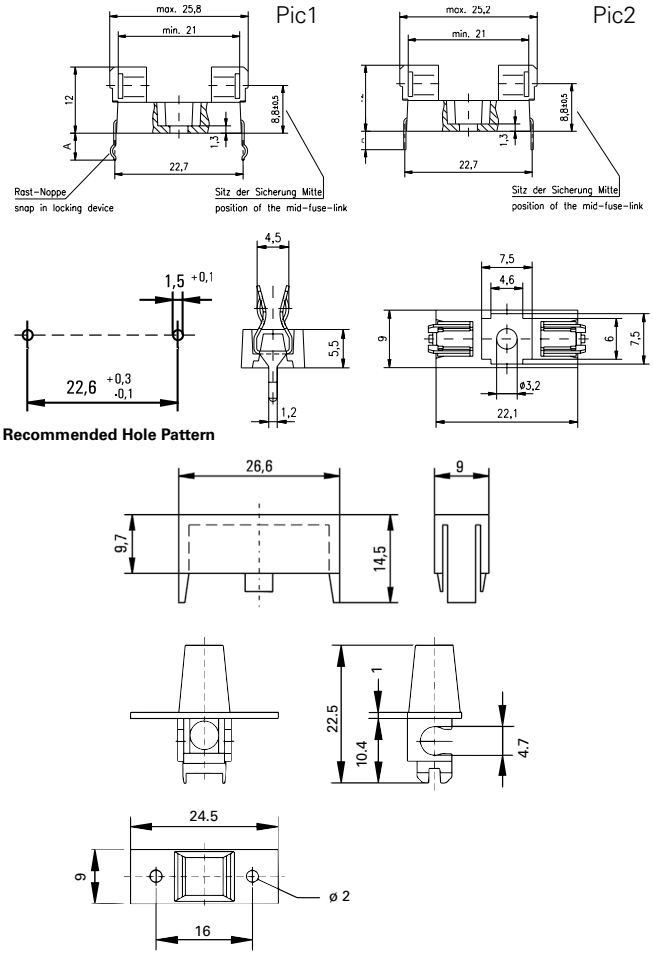
648 Cover (Optional Cover)

640 Adapter (Optional Adapter)



646 Series Holder

Dimensions



Recommended Hole Pattern

Contact Littelfuse for an auto-insertable fuse, holder and adapter assembly.

Note: 1.00 means the number one with two decimal places. 1,000 means the number one thousand.

Product Characteristics

Compatible Fuse Sizes	**For 5×20mm Fuses**
Materials	**Holder:** Black Thermoplastic, UL94 V-0 Polyamide PA 6.6
	Cover: Transparent Thermoplastic,UL94 V-0, Polycarbonate PC
	Adapter: Polyester PBT, UL94 V-0
	Metal Parts: Tin plated Copper alloy
Electrical Data (23°C)	**Rated Voltage:** 250V
	Max. Current/Power: 6.3A/2.5W 5A/1W (with No. 648) 6.3A/1.6W (with No. 640)
Mounting	Solder pins 0.5mm×1.2mm Ø 3mm screw hole may be used optionally
Minimum Cross Section	Conducting path - 0.2mm²
Unit Weight	1.6g (Holder), 1.0g (Cover), 1.0g (Adapter)

Ordering Information

Ordering PN	Description	Pic	Meas. "A"	for PCB-thickness
646 0000 1003	Fuse Block	1	5mm	3mm
646 0000 1223	Fuse Block	1	3.2mm	1.5mm
646 0000 1233	Fuse Block	2	3.3mm	1.5mm

Ordering PN	Description	Fuse PN	Block PN
646 1200 7113	Fuse & Block Assy.	0215002.MXP	6460001233
646 1200 7123	Fuse & Block Assy.	0219002.MXAP	
646 1400 7143	Fuse & Block Assy.	0218004.MXP	
646 1400 7183	Fuse & Block Assy.	0215004.MXP	

Ordering PN	Description
640 0000 1003	Adapter - Black
640 0000 1403	Adapter - Brown
640 0000 1503	Adapter - White
640 0000 1603	Adapter - Yellow
640 0000 1703	Adapter - Green
640 0000 1903	Adapter - Blue

Additional Information

Datasheet | **Resources** | **Samples**

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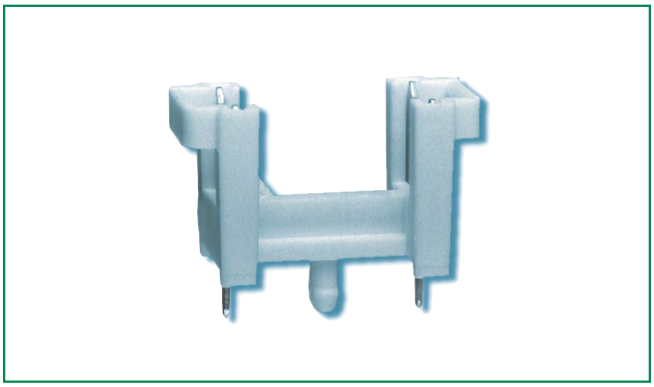
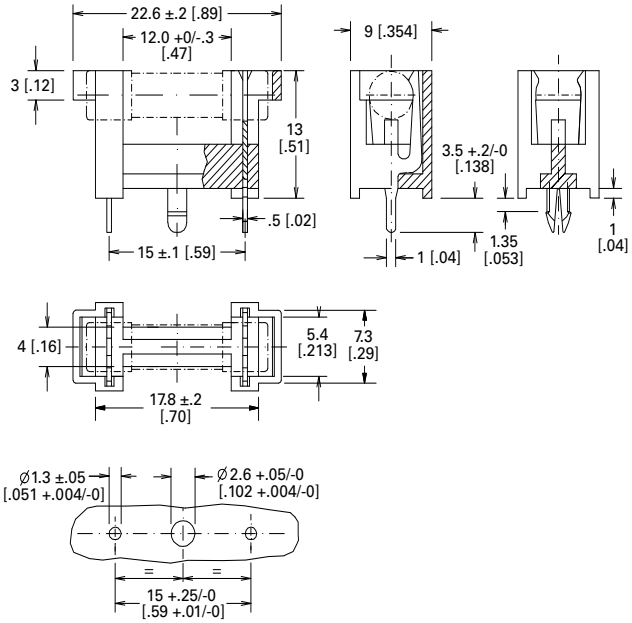
649 Series Molded Fuse Block, PC Mount for 5×20mm Fuses



Dimensions

Dimensions in millimeter [inch]



Dimensions of holes in the printed circuit board.
Thickness of printed circuit board: 1.6 ±.14 [.063 ±.005]

Product Specifications

Compatible Fuse Size	**5 x 20 mm standard cartridge fuse**	
Ordering Number	**649 0000 1039**	**649 0000 3039**
Materials	**Holder:** White Thermoplastic, PBT UL94 V-0	**Holder:** Grey Thermoplastic, PA 66 UL94 V-0
	Metal Parts: Tin Plated Copper Alloy	
Electrical Data	**Rated Voltage:** 250V **Max. Current/Power:** 6.3A/1.6W	
Mounting	Solder pins 0.5 x 1.0mm and plastic stud	
Operating Temperature	-30°C to +85°C	
Stock Conditions	+10°C to +60°C relative humidity ≤ 75% yearly average, without dew, maximum value for 30 days - 95%	
Contact Resistance	≤ 5mΩ	
Isolation Resistance	10^2MΩ	
Solderability	235°C, 2 sec. (soldering bath; IEC 60068-2-20)	
Soldering Heat Resistance	260°C, 10 sec. (soldering bath; IEC 60068-2-20)	
Minimum Cross Section	Conducting path - 0.2mm²	
Unit Weight	1.2g	

Agency Approvals

Agency	Agency File Number
UL	E14721
VDE	40015067

Ordering Information

Ordering PN	Description	Packaging
649 0000 1039	Block Holder for 5×20 big box	Bulk (3000pcs)
649 0000 3039	Block Holder for 5×20 MM GW	Bulk (3000pcs)

NOTES:

1) Ensure that proper fuse re-rating is factored in fuseholder selection.

2) The plastic material used in #649 0000 3039 is GWIT and GWFI compliant.

Additional Information

Datasheet | **Resources** | **Samples**

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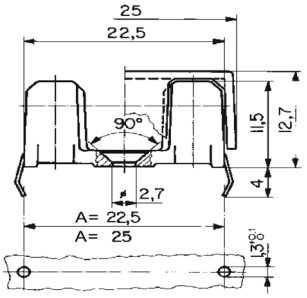
656 Series Molded Base PC Mount Fuse Block For 5×20mm Fuses

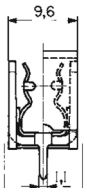
660 Cover
(OPAQUE - SUITABLE FOR INFRARED REFLOW SOLDERING PROCESSES)

659 Cover
(TRANSPARENT)

656 Series Holder

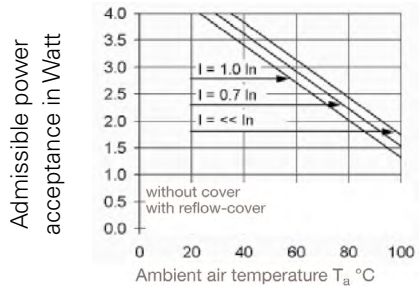
Dimensions

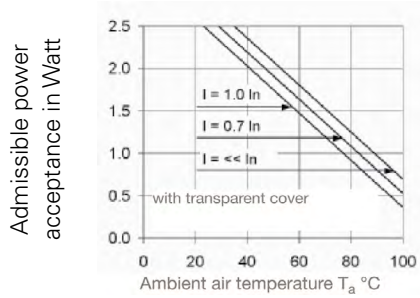




max. dimension for removal of cover

Re-rating curves





Product Characteristics

Compatible Fuse Size	**5×20mm**
Materials	**Holder:** Black Thermoplastic UL94 V-0
	Metal Parts: Tin plated copper alloy
Electrical Data	**Rated Voltage:** 250V
	Rated Current: 10A
	Rated Power: without cover: 4W **(23°C):** with reflow-cover: 4W with transparent cover: 2.5W
Mounting	656: Solder pins 0.4mm×1.1mm Ø 2.7mm screw hole may be used optionally
Operating Temperature	-40°C to +85°C
Climatic Category	40/085/21 acc. to IEC 60068-1
Stock Conditions	0 °C to 60 °C, at max. 70% relative humidity
Vibration Resistance	According to IEC 60068-2-6, Test Fc
Contact Resistance	<5mΩ
Dielectric Strength	> 3kV, 50 Hz, 1 min.
Impulse withstand Voltage	> 4kV between life parts
Insulation Resistance	(500 V DC/1 min): >10 MΩ between live parts of different potentials
Solderability	245°C/3 sec. acc. to IEC 60068-2-20, Test Ta, method 1
Soldering Heat Resistance	260°C/10 sec. acc. to IEC 60068-2-20, test Tb method 1
Minimum Cross Section	Conducting path - 0.2mm²
Torque/fixing screw	Max. 0.3 Nm

* Ensure that proper fuse re-rating is factored in fuseholder selection.

Agency Approval

Agency	Agency File Number
VDE	40001499
UL	E70164

Additional Information

Datasheet | **Resources** | **Samples**

Ordering Information

Part Number	Description	Packaging
65600001009	Fuse Block - "A" dimension 22.5mm	Bulk Pack (100 Pcs)
65600001409	Fuse Block - "A" dimension 25mm	Bulk Pack (100 Pcs)
65900000009	Fuse Holder Cover - Transparent plastic	Bulk Pack (100 Pcs)
66000001009	Fuse Holder Cover - Opaque plastic, suitable for infrared (IR) reflow soldering process	Bulk Pack (100 Pcs)

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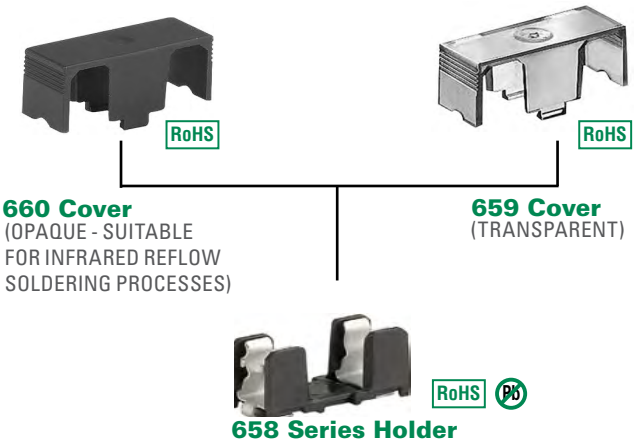
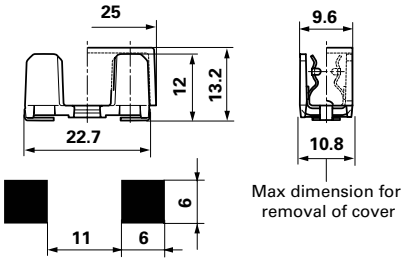
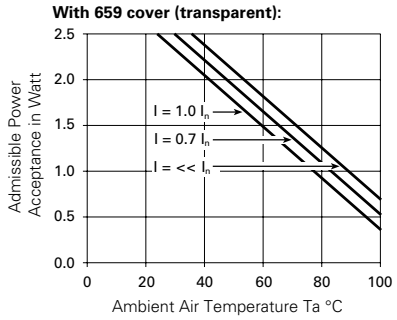
658 Series Molded Base Surface Mount Fuse Block For 5×20mm Fuses

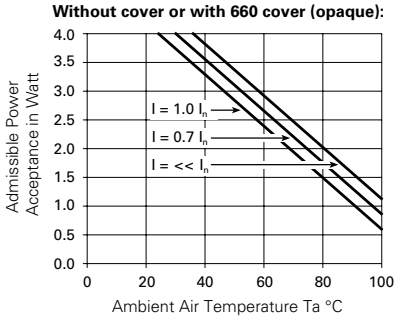


Product Dimensions (milimeter)



Derating Curves





Product Characteristics

Compatible Fuse	**5×20 mm**
Materials	**Clip Frame:** 65800001xxx: UL94 V-0 Black Thermoplastic 65800003xxx: UL94 V-0 Black LCP 65800004xxx: UL94 V-0 Black LCP
	Clip Terminals: 65800001xxx: Tin (Sn) plated copper alloy 65800003xxx: Tin (Sn) plated copper alloy 65800004xxx: Gold (Au) plated copper alloy
Electrical Data	**Rated Voltage:** 250 VAC (VDE); 250 VAC/DC (UL/CSA)
	Rated Current: 10A
	Rated Power Acceptance (at ambient air temp 23°C)**:** - 4W without cover - 4W with 660 cover - 2.5W with 659 cover
Mounting	SMT. Reflow soldering
Operating Temperature	-40°C to +85°C
Stock Conditions	0°C to +60°C, max 70% Relative humidity
Vibration Resistance	acc. to IEC 60068-2-6, test Fc
Contact Resistance	< 5 mΩ at 20 mV
Dielectric Strength	> 3kV, 50 Hz, 1 min.
Impulse withstand Voltage	> 4 kV between L-N
Insulation Resistance	(500 V DC/1 min): >10 MΩ
Solderability	245 - 260°C / max. 30 sec. acc. to JE-DEC J-STD-020D
Soldering Profile	JEDEC J-STD-020C: - 65800001xxx: 245(+0/-5)°C / 30 sec max. - 65800003xxx: 260(+0/-5)°C / 30 sec max. - 65800004xxx: 260(+0/-5)°C / 30 sec max.

* Ensure that proper fuse re-rating is factored in fuseholder selection.

Agency Approval

Agency	Agency File Number
VDE	40001499
CSA	251220 (see ordering info
UL	E70164 (see ordering info)

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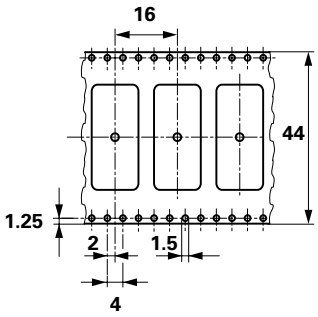
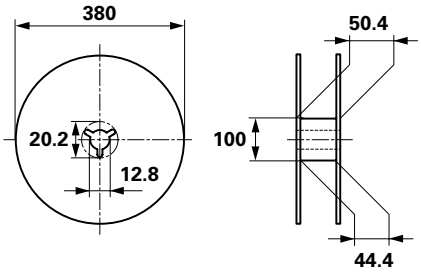
Cartridge Fuse Blocks

Packaging Dimensions (milimeter)

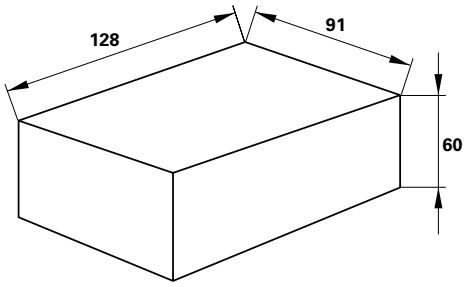
Tape Dimensions



Reel Dimensions



Ammo Pack Dimensions



Ordering Information

658 0000 1009	Fuse Holder - Thermoplastic / Tin terminals (100 pcs bulk)
658 0000 1109	Fuse Holder - Thermoplastic / Tin terminals (400 pcs tape & reel)
658 0000 3009*	Fuse Holder - LCP plastic / Tin terminals (100 pcs bulk)
658 0000 3109*	Fuse Holder - LCP plastic / Tin terminals (400 pcs tape & reel)
658 0000 4009*	Fuse Holder - LCP plastic / Gold terminals (100 pcs bulk)
658 0000 4109*	Fuse Holder - LCP plastic / Gold terminals (400 pcs tape & reel)
659 0000 0009	Fuse Holder Cover - Transparent plastic (100 pcs bulk)
660 0000 1009	Fuse Holder Cover - Opaque plastic, suitable for infrared (IR) reflow soldering processes (100 pcs bulk)

* Not UL Recognized or CSA.

Additional Information

Datasheet 658 Series | **Resources 658 Series** | **Samples 658 Series**

Datasheet 659 Series | **Resources 659 Series** | **Samples 659 Series**

Datasheet 660 Series | **Resources 660 Series** | **Samples 660 Series**

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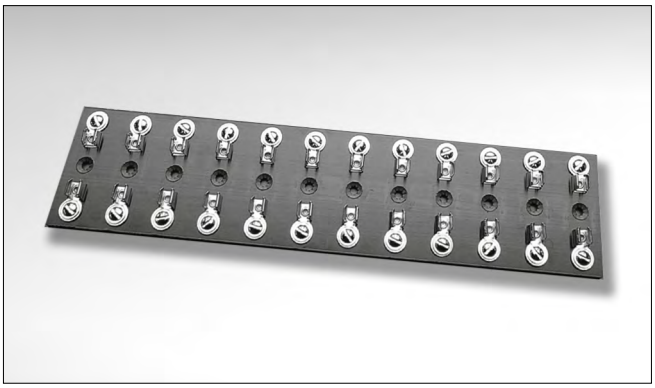
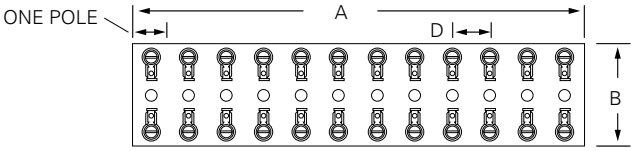
356/359 Screw Terminal Laminated Base Terminal for 3AG/AB Fuses



Dimensions



C = Board Thickness E = Overall Height

Fuse Type	A	B	C	D	E
3AG/3AB	See ordering infrmation	2.38"	.25"	.91"	.73"

Additional Information

Datasheet 356 Series

Resources 356 Series

Samples 356 Series

Datasheet 359 Series

Resources 359 Series

Samples 359 Series

Product Characteristics

Compatible Fuse Size	**3AG/AB**
Electical	356 Series Rated at 15 Amp. / 600 V AC/DC 359 Series rated at 30 Amp. / 600 V AC/DC
Clip/Terminals	356 000 Series: Nickel-plated spring brass 359 000 Series: Silver-plated beryllium copper
Terminals	B-32THD screw type
Base	Black phenolic laminate.
Mounting Hole	3AG Block: Reference Dimensions .142"/.147" diameter with .295"/.302"×82" C.S.

Agency Approvals

Agency	Agency File Number
	E14721

Ordering Information

# of Poles	Dimension "A"	Ordering Number	
1	.78"	**0356 0001Z**	**0359 0001Z**
2	1.69"	**0356 0002Z**	**0359 0002Z**
3	2.59"	**0356 0003Z**	**0359 0003Z**
4	3.50"	**0356 0004Z**	**0359 0004Z**
5	4.41"	**0356 0005Z**	**0359 0005Z**
6	5.31"	**0356 0006Z**	**0359 0006Z**
7	6.21"	**0356 0007Z**	**0359 0007Z**
8	7.12"	**0356 0008Z**	**0359 0008Z**
9	8.03"	**0356 0009Z**	**0359 0009Z**
10	8.94"	**0356 0010Z**	**0359 0010Z**
11	9.84"	**0356 0011Z**	**0359 0011Z**
12	10.75"	**0356 0012Z**	**0359 0012Z**

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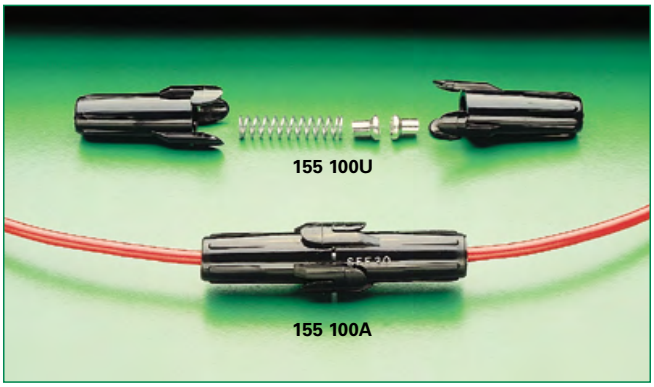
In-Line Cartridge Fuse Holders

155 Series Twist-Lock In-Line Holders for 3AG/AB Fuses

RoHS



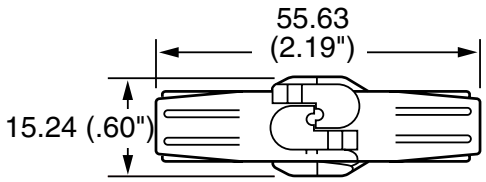
Product Characteristics

Compatible Fuses	**For low voltage 3AG/AB or SFE Fuse Applications**
Electrical	Intended for use at 32 volts or less with fuses rated up to 20 amperes when the proper spring is installed for fuse size.
Molded Parts	Black Thermoplastic (UL94 V-2). Body halves have a .14" diameter hole for insulated wire.
Ambient Temperature	–40°C to +75°C.
Contact Rivet	Brass. Nickel plating. Designed to accommodate #14 AWG stranded wire.
Assembled	Supplied with 19" loop of #14 AWG red vinyl insulated wire, SFE fuse (listed) with a spring in different lengths depending of the fuse size.
Unassembled	For assembly to #14 AWG wire.
Options	150 215 is similar to 155 120A except no fuse is supplied. It is intended for use with 3AG fuses rated up to 20 amperes.
In-Line Fuseholder	Supplied with a spring in different lengths depending of the fuse size.

* Please refer to Fuseology section for information on proper fuseholder re-rating.

** Fuseholders with specific wire sizes and lengths are available on special order.

Dimensions



Additional Information

Datasheet | **Resources** | **Samples**

Ordering Information

Unassembled			Assembled			Packaging
Ordering Number	Catalog Number	For Fuse Size	Ordering Number	Catalog Number	Fuse Installed	
-	**155 100**	All below	**01550100Z***	-	-	Bulk Pack (100 Pcs)
01550104ZXU	**155 104U**	¼" × 5/8"	**01550104ZXA**	**155 104A**	SFE 4	Bulk Pack (100 Pcs - Assembled) (100 Pcs- Unassembled)
01550106ZXU	**155 106U**	¼" × ¾"	**01550106ZXA**	**155 106A**	SFE 6	Bulk Pack (100 Pcs - Assembled) (100 Pcs- Unassembled)
01550109ZXU	**155 109U**	¼" × 7/8"	**01550109ZXA**	**155 109A**	SFE 9	Bulk Pack (100 Pcs - Assembled) (100 Pcs- Unassembled)
01550114ZXU	**155 114U**	¼" × 1 1/16"	**01550114ZXA**	**155 114A**	SFE 14	Bulk Pack (100 Pcs - Assembled) (100 Pcs- Unassembled)
01550120ZXU	**155 120U**	¼" × 1 ¼"	**01550120ZXA**	**155 120A**	SFE 20	Bulk Pack (100 Pcs - Assembled) (100 Pcs- Unassembled)
-	-	¼" × 1 1/16"	**01500215Z**	-	-	Bulk Pack (100 Pcs)
		¼" × 1 ¼"				

* Supplied with 8" loop of #14 AWG red vinyl insulated wire and two springs in different lengths to accommodate SFE sized fuses. (Fuse not included)

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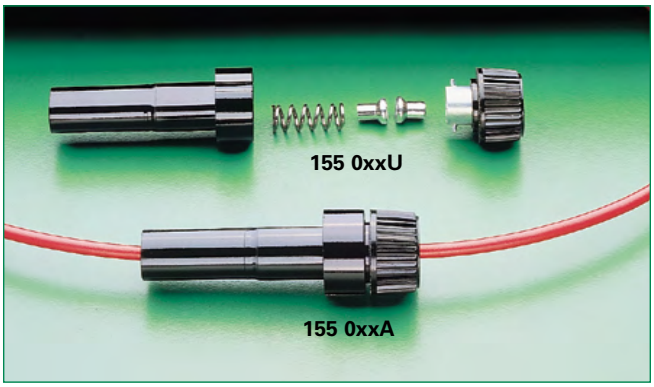
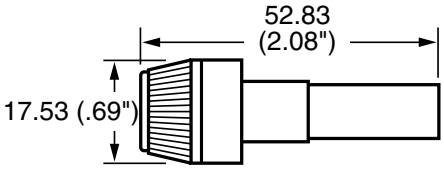
155 Series Heavy-Duty Bayonet Knob In-Line Holders for 3AG/AB Fuses

RoHS



Dimensions



Product Characteristics

Compatible Fuses	**For Low voltage 3AG/AB or SFE Fuse Applications**
Electrical	Intended for use at 32 volts or less with fuses rated up to 20 amperes when the proper spring is installed for full size.
Molded Parts	Body and knob are Black Thermoset (UL94 V-0). Both body and knob have a .20" diameter hole for insulated wire.
Knob	Bayonet-lock type metal insert.
Ambient Temperature	–40°C to +125°C.
Contact Rivet	Brass. Tin plated. Designed to accommodate #14 AWG stranded wire.
Assembled	Supplied with 19" loop of #14 AWG red vinyl insulated wire, SFE fuse (listed) with a spring in different lengths depending of the fuse size.
Unassembled	For assembly to #14 AWG wire.
Options	150 079 is similar to 155 020A except no fuse is supplied. It is intended for use with 3AG fuses rated up to 20 amperes.
In-Line Fuseholder	Supplied with a spring in different lengths depending of the fuse size.

* Please refer to Fuseology section for information on proper fuseholder re-rating.

** Fuseholders with specific wire sizes and lengths are available on special order.

Additional Information

Datasheet | **Resources** | **Samples**

Ordering Information

Unassembled			Assembled			Packaging
Ordering Number	Catalog Number	For Fuse Size	Ordering Number	Catalog Number	Fuse Installed	
01550004ZXU	**155 004U**	¼" × 5/8"	**01550004ZXA**	**155 004A**	SFE 4	Bulk Pack (100 Pcs)
01550006ZXU	**155 006U**	¼" × ¾"	**01550006ZXA**	**155 006A**	SFE 6	Bulk Pack (100 Pcs)
01550009ZXU	**155 009U**	¼" × 7/8"	**01550009ZXA**	**155 009A**	SFE 9	Bulk Pack (100 Pcs)
01550014ZXU	**155 014U**	¼" × 1 1/16"	**01550014ZXA**	**155 014A**	SFE 14	Bulk Pack (100 Pcs)
01550020ZXU	**155 020U**	¼" × 1 ¼"	**01550020ZXA**	**155 020A**	SFE 20	Bulk Pack (100 Pcs)
-	-	¼" × 1 ¼"	**01500079Z**	-	-	Bulk Pack (100 Pcs)
-	-	¼" × 1 ¼"	**01500145HXB***	-	-	Bulk Pack (100 Pcs)
-	-	¼" × 7/8"	**01500145Z****	-	-	Bulk Pack (100 Pcs)
		¼" × 1 1/16"				
		¼" × 1 ¼"				

* Supplied with 15" loop of #14 AWG red vinyl insulated wire

** and three springs in different lenghts to accommodate SFE sized fuses.

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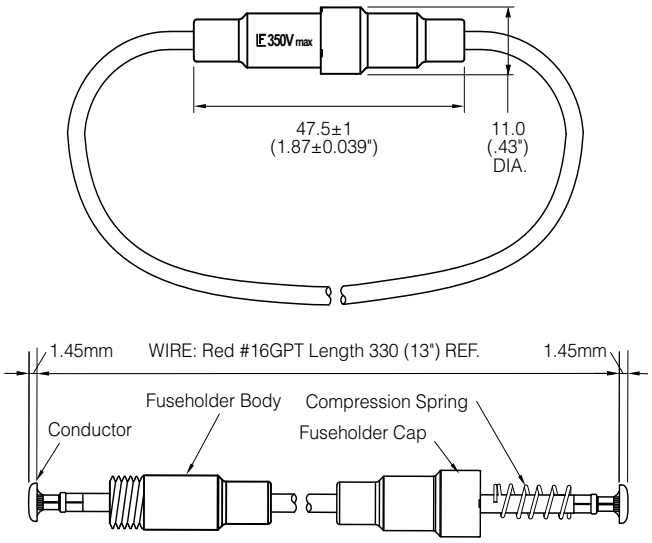
In-Line Cartridge Fuse Holders

150 Series In-Line Holders for 2AG or 5×20mm Fuses

Agency Approval

Agency	Agency File Number
c UL us	E14721

Dimensions [mm]



Product Characteristics

Compatible Fuses	**2AG or 5×20mm**
Electrical	This fuseholder, part number 150274, is intended for use with 2AG and 5 × 20mm fuses. Maximum current ratings are 5 amperes at 350V for the 2AG size fuses and 10 amperes at 350V for the 5 × 20mm size fuses.**
Body	Black Nylon, UL94 V-0
Terminals	Brass
Wire	16 Awg size; Nominal o.d. 0.104"; color Red
Lead Pull Test	Will withstand 10 lb. pull.
Ambient Temperature	–40°C to +80°C.

NOTES:
* Ensure that proper fuse re-rating is factored in fuseholder selection.
** If use above 32V, power must be turn off when changing the fuse.

Ordering Information

Ordering Number	Packaging
01500274Z	Bulk Pack (1000 Pcs)
01500274LXN	Bulk Pack (100 Pcs)
***01500274ZXU**	Bulk Pack (5000 Pcs)

NOTES:
* For unassembled Fuseholder, UL certification does not apply.

Additional Information

Datasheet | **Resources** | **Samples**

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242 Series Barrier Network Fuse

RoHS HF

Description

The 242 Series hazardous area barrier network fuse offers a range of fuses designed to enable greater safety operating electronic equipment within potentially explosive environments.

Features

- High interrupting rating suitable for intrinsic safety protection of hazardous locations equipment.
- Available in both axial lead and surface mount.
- RoHS compliant and Halogen-free

Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0.050 - 0.250 A

Applications

- Intrinsic saftey electrical equipment; Electrical connections and components, Test equipment

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	4 hours, Minimum
300%	10 seconds, Maximum
1000%	0.002 seconds, Maximum

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

Ampere Rating (A)	Amp Code	Body Color Coding	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 Sec.)	Agency Approvals
0.050	.050	Red	4000A @ 250VAC/VDC	11.34	0.000103	x
0.080	.080	Green		8.19	0.000214	x
0.100	.100	Blue		3.60	0.000977	x
0.125	.125	Orange		3.78	0.001026	x
0.160	.160	Violet		3.00	0.00157	x
0.200	.200	Brown		2.68	0.0025	x
0.250	.250	Black		1.6	0.00579	x

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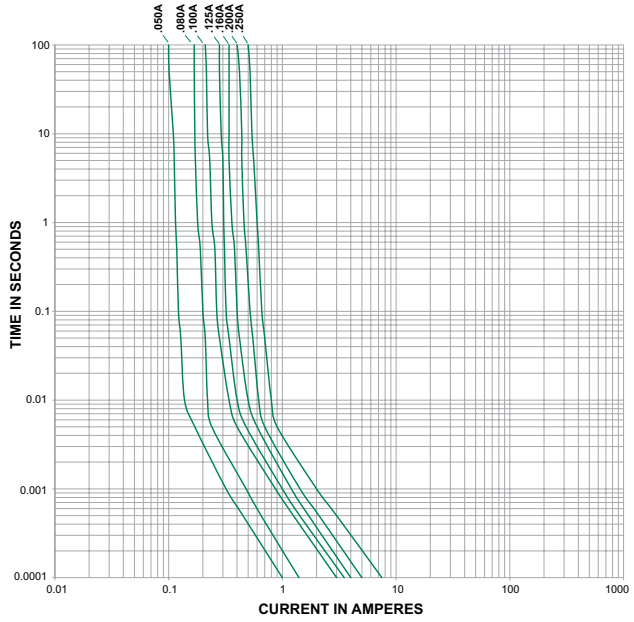
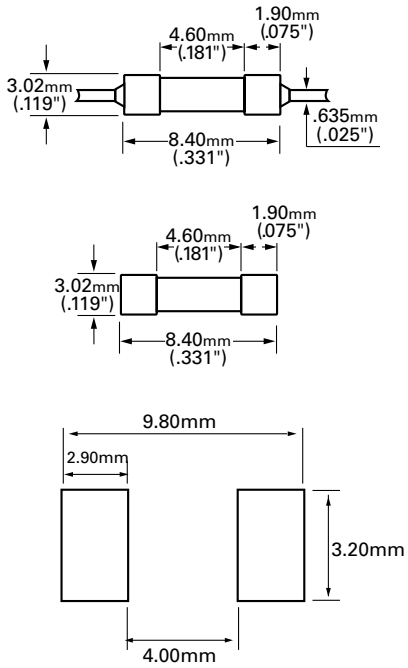
Special Application Fuses
242 Series Barrier Network Fuse

Average Time Current Curves

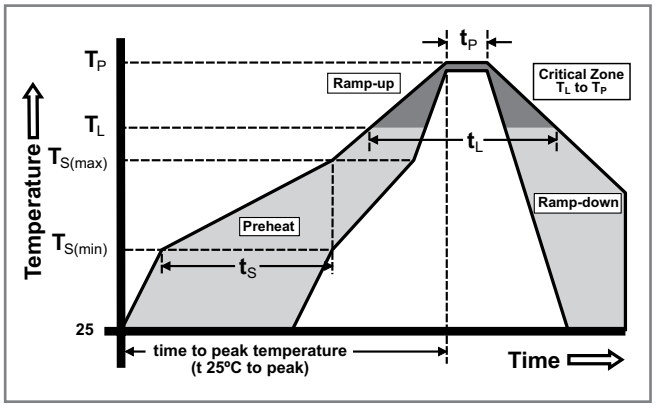


Dimensions



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 – 180 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 – 150 seconds
Peak Temperature (T_P)		$250^{+0/-5}$ °C
Time within 5°C of actual peak Temp. (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	260°C, 10 seconds max.

Product Characteristics

Operating Temperature	–40°C to 125°C (Consider re-rating)
Thermal Shock	Withstands 5 cycles of – 55°C to 125°C
Vibration	Per MIL-STD-202 Method 201
Insulation Resistance (After Opening)	Greater than 10,000 ohms.

Part Numbering System

0242.050UAT1

SERIES

AMP CODE

Refer to Amp Code column in the Electrical Specifications table.

QUANTITY & PACKAGING CODE

HAT1 = 100 pcs, Axial Leaded, Ammo Pack T1 Tape
UAT1 = 500 pcs, Axial Leaded, Ammo Pack T1 Tape
UR = 500 pcs, Surface Mount, Tape & Reel

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Special Application Fuses
PICO® 259 Series Safe-T-Plus Fuse for Hazardous Locations

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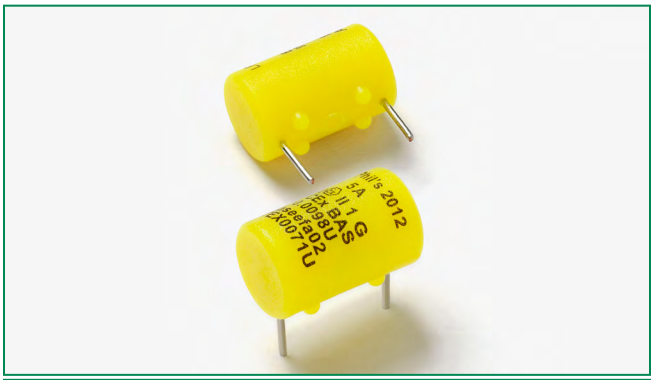
PICO® 259 Series Safe-T-Plus Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
Ex	Baseefa02ATEX0071U	0.062A - 5A
IEC IECEx	IECEx BAS 10.0098U	0.062A - 5A
UL	E10480	0.062A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 Hours, Minimum
200%	5 Seconds, Maximum

Reference Standards

Agency	Standards
ATEX	EN 60079-0, EN 60079-11
IECEx	IEC 60079-0, IEC 60079-11

Description

The Safe-T-Plus 259 Series offers a range of encapsulated fuses designed to enable greater safety for operating electronic equipment within potentially explosive environments. Originally designed to serve the needs of gas plants, petrochemical and processing industries, these fuses are certitifed for use within intrinsically safe apparatus with ATEX and IECEx certifications.

The fuse design and its encapsulant are suitable for use in intrinsically safe appartatus and associated apparatus for voltage not exceeding 125V rms (190V peak).

Features

- Encapsulated and sealed (1mm minimum)
- 0.062A - 5A range options
- Designed to operate within environments where there is danger of gas explosion from faulty circuits
- ATEX and IECEx certified components
- RoHS compliant

Applications

- Testing, measuring or processing electronic and electrical equipment

Additional Information

Datasheet | Resources | Samples

Electrical Specifications by Items

Ampere Rating (A)	Amp Code	Interrupting Rating	Nominal Melting I²t (A² Sec.)	Minimum Cold Resistance at -20°C (Ohms)	Minimum Cold Resistance at -40°C (Ohms)	Nominal Cold Resistance at 25°C (Ohms)	Agency Approvals		
							Ex	IEC IECEx	UL
0.062	.062	50A @ 125 VAC 300A @ 125 VDC	0.00011	4.89	4.39	7.00	x	x	x
0.125	.125		0.0012	1.35	1.26	1.70	x	x	x
0.250	.250		0.0095	0.51	0.48	0.665	x	x	x
0.375	.375		0.025	0.32	0.29	0.395	x	x	x
0.500	.500		0.0598	0.24	0.22	0.302	x	x	x
0.750	.750		0.153	0.14	0.12	0.175	x	x	x
1.00	001.		0.256	0.10	0.07	0.128	x	x	x
3.00	003.		1.27	0.03	0.01	0.03	x	x	x
5.00	005.	50A @ 125 VAC 300A @ 63 VDC	4.14	0.01	0.005	0.0158	x	x	x

1) The fuse must be so mounted that creepage and clearance distances aren't impaired in any way.
2) The fuse is suitable for use in intrinsically safe equipment for voltages not exceeding 190V peak.
3) Maximum surface temperature rise at 170% rated current: ≤750mA=40°C, 1A=55°C, 3A=118°C and 5A=135°C.

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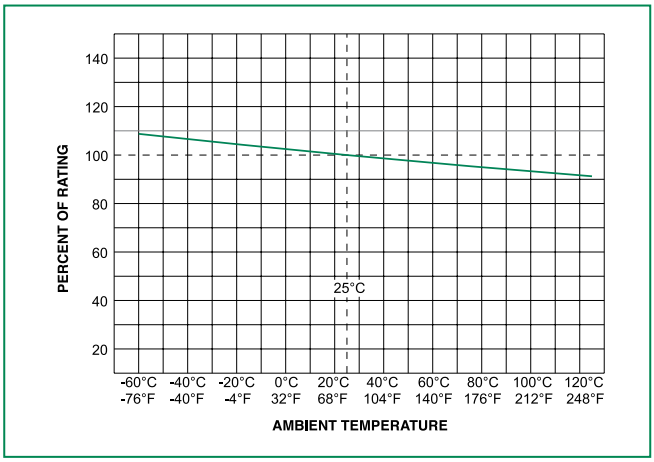
Special Application Fuses

PICO® 259 Series Safe-T-Plus Fuse for Hazardous Locations

Product Characteristics

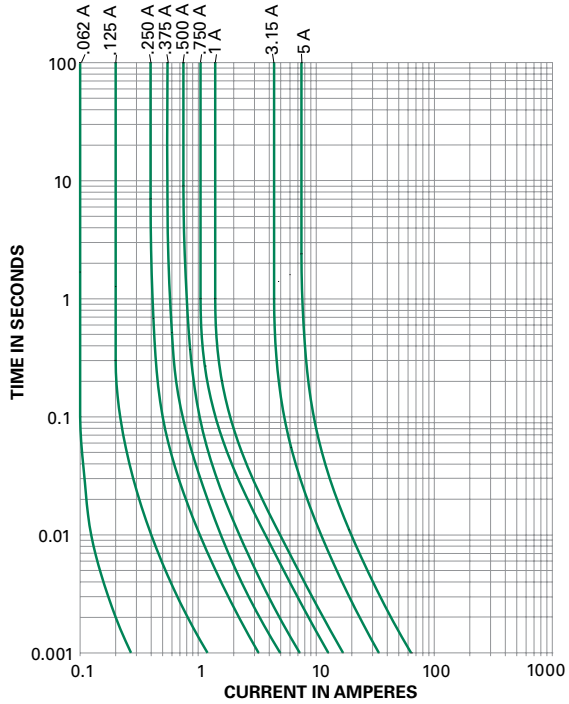
Materials	Body : Polyamide Terminals - Tin Plated Copper Alloy Max. operating temperature of materials 130°C
Operating Temperature	Operating temperature depends on fuse rating and max. allowed fuse surface temperature. (Consider re-rating)
Thermal Shock	Withstands 5 cycles of – 55°C to 125°C
Vibration	Per MIL-STD-202, Method 201
Insulation Resistance (After Opening)	Greater than 10,000 ohms

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

Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand Soldering Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process

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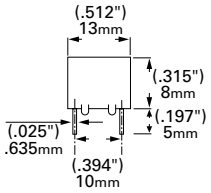
Dimensions



Part Numbering System

0259.062M

SERIES

AMP Code

The dot is poisitioned before the Packaging Suffix with whole ratings and within the numbering sequence for fractional ratings. Refer to Amp Code column in the Electrical Specifications table.

PACKAGING Code

M = Bulk pack, 1000 pcs
T = Bulk pack, 10 pcs

Example:
1 amp product is
0259**001.**M
(.062 amp product shown).

Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Bulk	N/A	1000	M = Bulk 1000 pieces, T = Bulk 10 pieces Please refer to available quantities above in "Part Numbering System"
Bulk	N/A	10	

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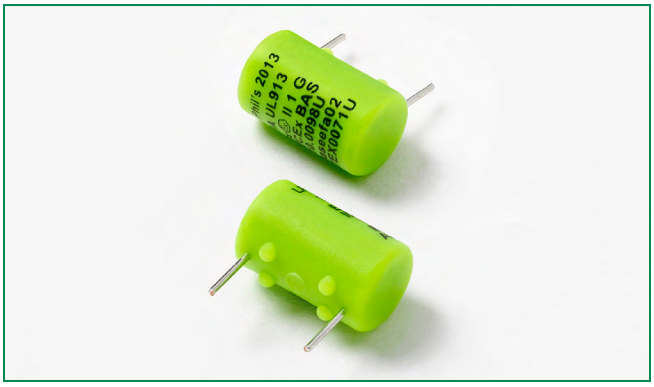
PICO® 259-UL913 Series Intrinsically Safe Fuse



Description

The 259-UL913 Series offers a range of encapsulated fuses certified under the UL 913, the standard for intrinsically safe electrical equipment, to operate in hazardous locations. Ideal for use in the oil, gas, mine, chemical process, and pharmaceutical industries, the 259-UL913 fuse was designed to limit the energy and temperature generated during its operation. In addition to UL913, these fuses meet ATEX and IECEx requirements. The fuse design and its encapsulant are suitable for use in intrinsically safe appartatus and associated apparatus for voltage not exceeding 125V rms (190V peak).

Features

- Encapsulated and sealed (1mm minimum)
- 0.62A - 5A range options
- Designed to operate within hazardous environments
- Global hazardous location certifications

Applications

- Testing, measuring or processing electronic and electrical equipment

Agency Approvals

Agency	Agency File Number	Ampere Range
Ex	Baseefa02ATEX0071U	0.62A - 5A
	E10480 E358130	0.62A - 5A
IEC IECEx	IECEx BAS 10.0098U	0.62A - 5A

Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 Hours, Minimum
200%	5 Seconds, Maximum

Reference Standards

Agency	Standards
ATEX	EN 60079-0, EN 60079-11
IECEx	IEC 60079-0, IEC 60079-11

Electrical Specifications by Items

Ampere Rating (A)	Amp Code	Interrupting Rating	Nominal Melting I^2t (A^2 Sec.)	Minimum Cold Resistance at -20°C (Ohms)	Minimum Cold Resistance at -40°C (Ohms)	Nominal Cold Resistance at 25°C (Ohms)	Agency Approvals		
							Ex	IEC IECEx	
0.062	.062	50A @ 125 VAC 300A @ 125 VDC	0.00011	4.89	4.39	7.00	x	x	x
0.125	.125		0.0012	1.35	1.26	1.70	x	x	x
0.250	.250		0.0095	0.51	0.48	0.67	x	x	x
0.375	.375		0.025	0.32	0.29	0.395	x	x	x
0.500	.500		0.0598	0.24	0.22	0.302	x	x	x
0.750	.750		0.153	0.14	0.12	0.175	x	x	x
1.00	001.		0.256	0.10	0.07	0.128	x	x	x
3.00	003.		1.27	0.03	0.01	0.03	x	x	x
5.00	005.	50A @ 125 VAC 300A @ 63 VDC	4.14	0.01	0.005	0.0158	x	x	x

Schedule of limitations:

1) The fuse must be mounted in such a way that creepage and clearance distances aren't impaired in any way.

2) The fuse is suitable for use in intrinsically safe equipment for voltages not exceeding 190V peak.

3) Maximum surface temperature rise at 170% rated current: ≤750mA=40°C, 1A=55°C, 3A=118°C and 5A=135°C.

Additional Information

Datasheet | Resources | Samples

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Special Application Fuses
PICO® 259-UL913 Series Intrinsically Safe Fuse for Hazardous Locations

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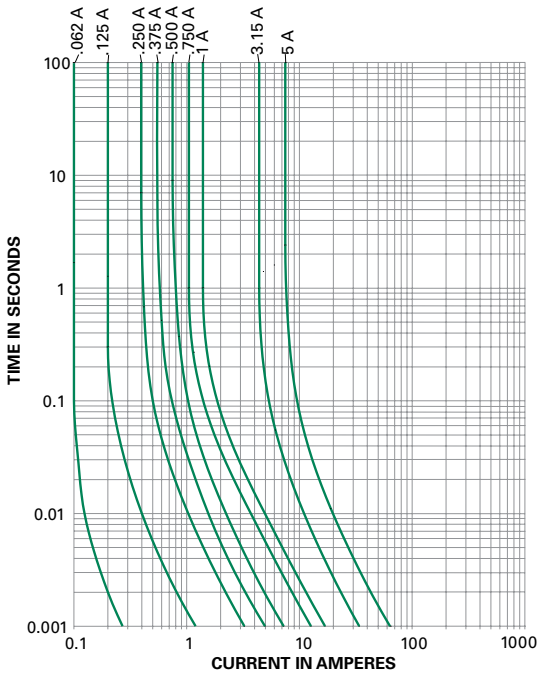
Product Characteristics

Operating Temperature	
Current Rating	Ambient Temperature
≤ 0.750 A	- 40°C to +81°C
1 A	- 40°C to +73°C
3 A	- 40°C to +74°C
5 A	- 40°C to +45°C

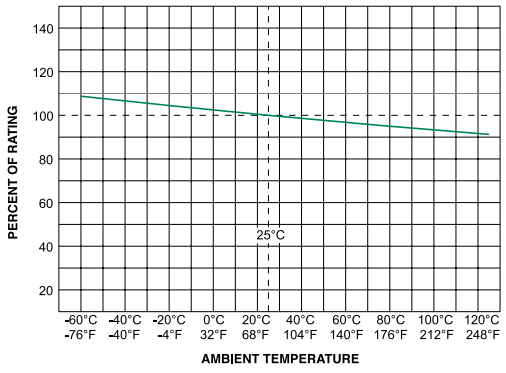
Notes:
1. Any use of the 259-UL913 Series fuse outside of the ambient temperature ranges specified in the table is subject to additional investigation.
2. Specified ambient temperature range is for intrinsic safety certification.

Materials	Body : Polyamide Terminals - Tin Plated Copper Alloy Maximum operating temperature of Materials is 130°C
Operating Temperature	For operating temperature see table above (Consider re-rating)
Thermal Shock	Withstands 5 cycles of – 55°C to 125°C
Vibration	Per MIL-STD-202, Method 201
Insulation Resistance (After Opening)	Greater than 10,000 ohms (at 250V DC)

Average Time Current Curves



Temperature Re-rating Curve



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

Soldering Parameters

Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat: (Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand Soldering Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process

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Special Application Fuses

PICO® 259 Series Safe-T-Plus Fuse for Hazardous Locations

Part Numbering System

0259.062M X913

SERIES

AMP Code

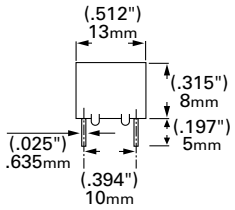
The dot is poisitioned before the Packaging Suffix with whole ratings and within the numbering sequence for fractional ratings. Refer to Amp Code column in the Electrical Specifications table.

PACKAGING Code

M = Bulk pack, 1000 pcs
T = Bulk pack, 10 pcs

Example:
1 amp product is
0259**001.**MX913
(.062 amp product shown).

Dimensions



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
Bulk	N/A	1000	M = Bulk 1000 pieces, T = Bulk 10 pieces Please refer to available quantities above in "Part Numbering System"
Bulk	N/A	10	

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481 Series Alarm Indicating Fuse

Description

481 Series alarm indicating fuses are designed to reduce down time by immediately pinpointing the blown (open) circuit while triggering an LED or audio alarm. This item requires 482 Series mating fuse holder.

All ranges of 481 Series fuses are available as our original design, and the 2-20 amp range is now available as a RoHS compliant option (use the "P" designator when ordering). See the part numbering section of this data sheet for related ordering instructions.

Agency Approvals

Agency	Agency File Number	
	E71611	0.080A - 20A
	29862	0.080A - 20A

Features

- Color-coded indicator flags indicate ampere rating.
- Clear plastic lens option available for additional safety.
- RoHS compliant
- Body is constructed of black plolyphenylene sulfide with UL-94V0 flammability rating.
- Contacts made of bright alloy-plated beryillium copper.

Electrical Characteristics

% of Ampere Rating	Opening Time
100%	10 Minutes, Minimum
150%	5 Minutes, Maximum

Applications

Ideal for telecommunications and control panel circuits

Electrical Characteristics

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Body Color Code	Nominal Cold Resistance (Ohms)	Nominal Melting I^2t (A^2 Sec.)	Agency Approvals	
0.180*	.180	125 VAC & 125 VDC	40A @ 175 VDC	Yellow	6.25	0.0400	x	x
0.200*	.200			Red/Black	5.70	0.0576	x	x
0.250*	.250			Violet	4.20	0.0625	x	x
0.375*	.375			Gray/White	2.00	0.230	x	x
0.500*	.500			Red	1.52	0.490	x	x
0.650*	.650		450A @ 60 VDC 300A @ 125 VAC (up to 20A) 300A @ 125 VDC (up to 15A) 200A @ 125 VDC (up to 20A) 460A @ 60 VDC (up to 15A)	Black	1.25	0.723	x	x
0.750*	.750			Brown	.980	1.32	x	x
1.00*	001.			Gray	.665	1.82	x	x
1.33*	1.33			White	.480	3.13	x	x
1.50*	01.5			Yellow/White	.385	2.55	x	x
2.00	002.			Orange	.120	10.2	x	x
2.50	02.5			Orange/White	0.093	16.0	x	x
3.00	003.			Blue	.0670	25.0	x	x
3.50	03.5			Blue/White	.0415	10.5	x	x
4.00	004.			Brown/White	.0350	36.0	x	x
5.00	005.			Green	.0285	64.0	x	x
7.50	07.5			White/Black	.0113	121.0	x	x
10.0	010.			White/Red	.00840	380.3	x	x
12.0	012.			Yellow/Green	.00660	571.2	x	x
15.0	015.			Blue/Red	.00580	900.0	x	x
20.0**	020.			White/Green	.00394	1024.0	x	x

* 0.180A thru 1.5A items are not available for sale as a RoHS compliant "P" option
**20A Fuseholder must be used. Fuse is keyed to prevent insertion in lower rated holders. 20A Fuseholder is designed to accept all ratings up to 20 amperes.

Additional Information

Datasheet | Resources | Samples

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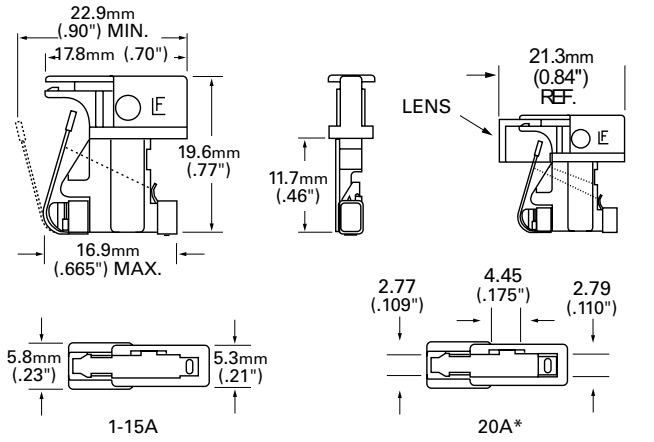
Special Application Fuses
481 Series Alarm Indicating Fuse

Product Characteristics

Material	Body: Polyphenylene Sulfide (UL 94VO) Terminations: Beryllium Copper/Tin Plated Optional Lens: Nylon
Vibration	MIL-STD-202 Method 201

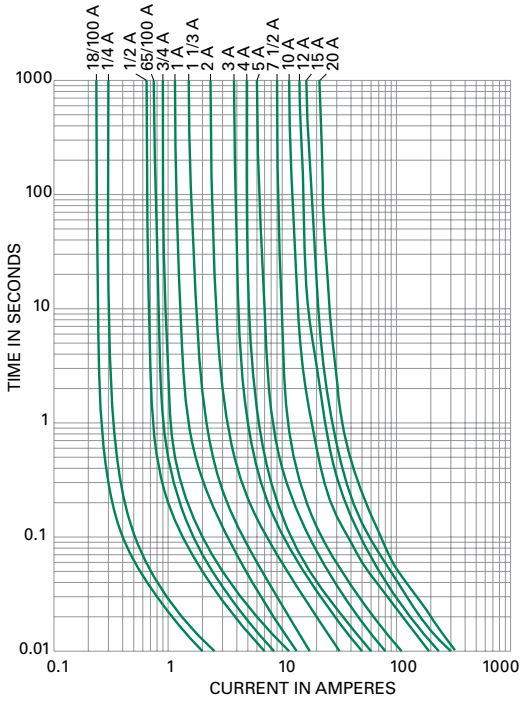
Operating Temperature	– 55°C to 125°C.
Thermal Shock	Withstands 5 cycles of – 55°C to 125°C
Insulation Resistance (After Opening)	Greater than 10,000 ohms.

Dimensions



*20A Fuseholder must be used. Fuse is keyed to prevent insertion in lower rated holders. 20A Fuseholder is designed to accept all ratings up to 20 amperes.

Average Time Current Curves



Part Numbering System

0481 .180 H XL M P

- **RoHS ITEM OPTION CODE:**
  - Blank = Standard design item
  - P = RoHS compliant version item (available in 2-20 Amp Range only)
- **AMPERAGE STAMPING MARK:**
  - Blank = Standard design item
  - M = Front Side
- **ACCESSORY:**
  - Blank = Standard design item
  - X = Filler
  - XL = Protective Lens
- **QUANTITY CODE:**
  - V = 5 pack
  - H = 100 pack
- **AMP COLOR CODE:**
  - (See Electrical Characteristics Table)
- **FUSE SERIES**

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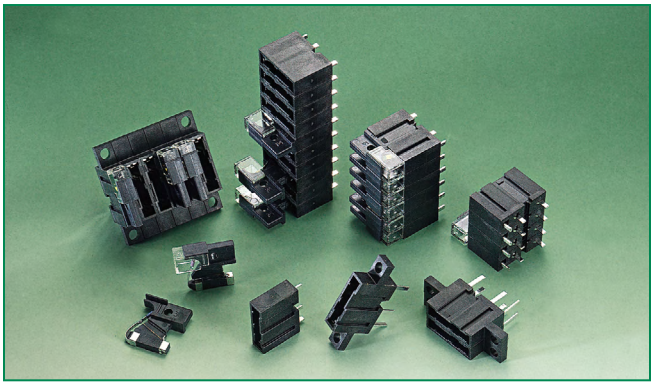
482 Series Fuseholders



Description

Ideal for telecommunications and control panel circuits, the 482 Series fuseholder is designed for use with Littelfuse 481 Alarm Indicating Fuses. Each holder is designed to accept other manufacturers' replacement fuses as well.

The fuseholder is available in three versions:

PCB Mount - 15A: Can be soldered directly to a printed circuit board. Rated up to 15 amperes. Available in single pole or gangable up to 20 poles. Fuseholder is keyed to prevent insertion of 20 ampere fuse.

Panel Mount - 20A: Available in a single pole version rated up to 20 amperes. Large leads for wire attachment.

Panel Mount - 15A: 15 ampere gangable version of fuseholder is keyed to prevent insertion of 20 ampere fuse.

Agency Approvals

Agency	Agency File Number
	E14721
	7316 (15A Only)

Product Characteristics

482 Fuseholder Series	15A PCB Mount and Panel Mount	20A Panel Mount
Electrical Rating	Rated at 15 amperes up to 125 VAC/ VDC	Rated at 20 amperes up to 125 VAC/ VDC
Body Material	Thermoplastic (UL 94V-0)	Thermoplastic (UL94 V-0)
Fuse Terminal Material	Tin-plated Beryllium Copper	Tin-plated Beryllium Copper
Alarm Terminal Material	Tin-plated Brass	Tin-plated Brass
Operating Temperature	–55°C to +125°C.	-40°C to 85°C
Thermal Shock	Withstands 5 cycles of –55°C to 125°C	Withstands 5 cycles of –55°C to 125°C
Vibration	Per MIL-STD-202	Per MIL-STD-202
Insulation Resistance (After Opening)	Greater than 10,000 ohms.	Greater than 10,000 ohms.

Additional Information

Datasheet | **Resources** | **Samples**

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Specifications are subject to change without notice. Application testing is strongly recommended.
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Ordering Information

20A Panel Mount Fuseholder

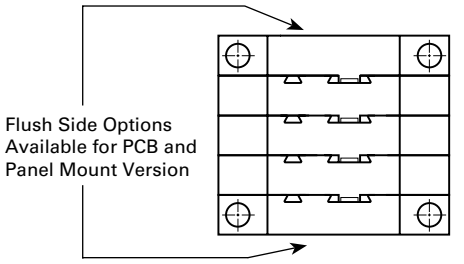
Type	Holder Length *	20A Panel Mount
1 Pole	6.40mm (.25")	0482 2001ZXPF

* NOTE: 20 ampere version of 482 Series Panel Mount fuseholders come standard as a single pole unit with flush edges on both sides (no "keys" typical with 15A units). Please refer to the diagrams on the following page for additional information.

15A PCB Mount and Panel Mount Fuseholders

Type	Holder Assembly Length*	15A PCB Mount	15A PCB Mount - Flush	15A Panel Mount	15A Panel Mount - Flush
1 Pole	6.40mm (.25")	0482 0001ZXB	0482 0001ZXBF	0482 0001ZXP	0482 0001ZXPF
2 Pole	12.80mm (.50")	0482 0002ZXB	0482 0002ZXBF	0482 0002ZXP	0482 0002ZXPF
3 Pole	19.05mm (.75")	0482 0003ZXB	0482 0003ZXBF	0482 0003ZXP	0482 0003ZXPF
4 Pole	25.04mm (1.0")	0482 0004ZXB	0482 0004ZXBF	0482 0004ZXP	0482 0004ZXPF
5 Pole	31.75mm (1.25")	0482 0005ZXB	0482 0005ZXBF	0482 0005ZXP	0482 0005ZXPF
6 Pole	38.10mm (1.50")	0482 0006ZXB	0482 0006ZXBF	0482 0006ZXP	0482 0006ZXPF
7 Pole	44.45mm (1.75")	0482 0007ZXB	0482 0007ZXBF	0482 0007ZXP	0482 0007ZXPF
8 Pole	5.80mm (2.00")	0482 0008ZXB	0482 0008ZXBF	0482 0008ZXP	0482 0008ZXPF
9 Pole	57.15 (2.25")	0482 0009ZXB	0482 0009ZXBF	0482 0009ZXP	0482 0009ZXPF
10 Pole	63.50mm (2.50")	0482 0010ZXB	0482 0010ZXBF	0482 0010ZXP	0482 0010ZXPF
11 Pole	69.85mm (2.75")	0482 0011ZXB	0482 0011ZXBF	0482 0011ZXP	0482 0011ZXPF
12 Pole	76.20mm (3.00")	0482 0012ZXB	0482 0012ZXBF	0482 0012ZXP	0482 0012ZXPF
13 Pole	82.55mm (3.25")	0482 0013ZXB	0482 0013ZXBF	0482 0013ZXP	0482 0013ZXPF
14 Pole	88.90mm (3.50")	0482 0014ZXB	0482 0014ZXBF	0482 0014ZXP	0482 0014ZXPF
15 Pole	95.25mm (3.75")	0482 0015ZXB	0482 0015ZXBF	0482 0015ZXP	0482 0015ZXPF
16 Pole	101.60mm (4.00")	0482 0016ZXB	0482 0016ZXBF	0482 0016ZXP	0482 0016ZXPF
17 Pole	107.95mm (4.25")	0482 0017ZXB	0482 0017ZXBF	0482 0017ZXP	0482 0017ZXPF
18 Pole	114.30mm (4.50")	0482 0018ZXB	0482 0018ZXBF	0482 0018ZXP	0482 0018ZXPF
19 Pole	120.65mm (4.75")	0482 0019ZXB	0482 0019ZXBF	0482 0019ZXP	0482 0019ZXPF
20 Pole	127.00mm (5.00")	0482 0020ZXB	0482 0020ZXBF	0482 0020ZXP	0482 0020ZXPF
21 Pole	133.35mm (5.25")	0482 0021ZXB	0482 0021ZXBF	0482 0021ZXP	0482 0021ZXPF

* NOTE: 15 ampere gangable version of PCB Mount and Panel Mount fuseholders are keyed to prevent insertion of 20 ampere fuse. Please refer to "A" dimension of diagrams on following page. For additional terminal lengths, please contact Littelfuse.



5 POLE HOLDER ASSEMBLY
WITH FLUSH OPTION

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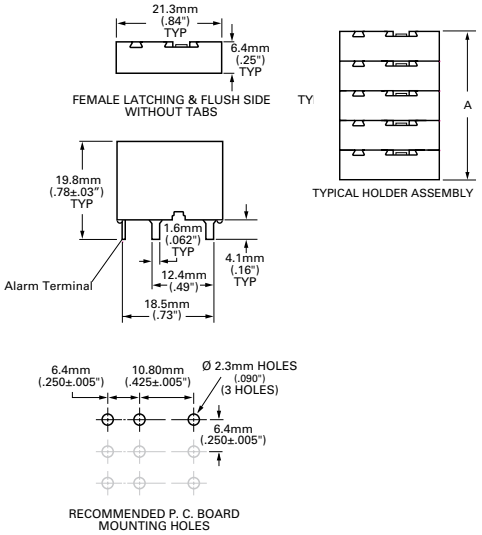
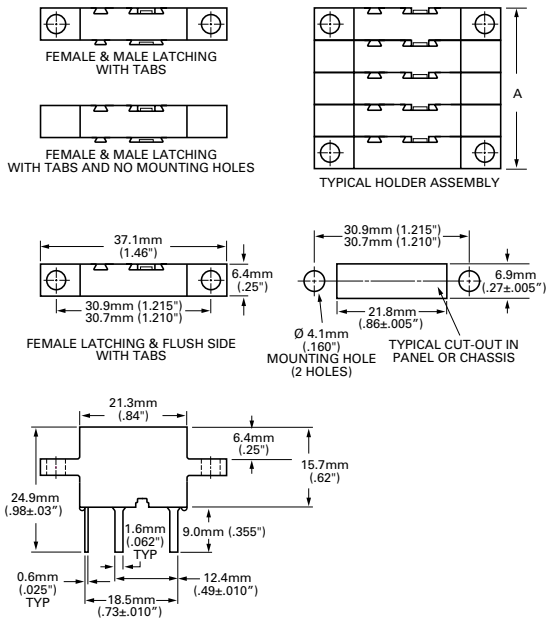
Dimensions

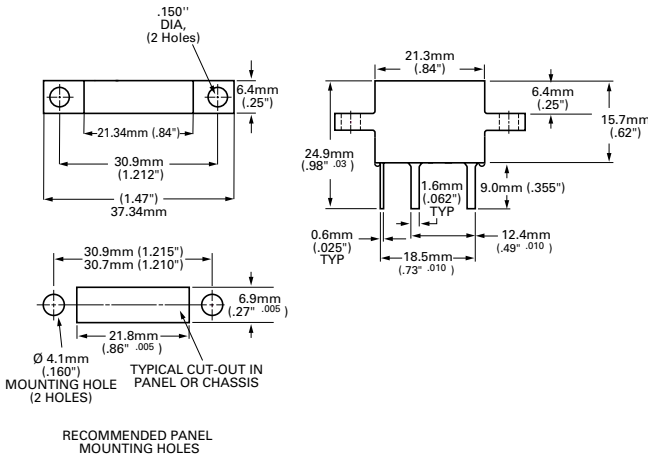
15A PCB Mount Series:



15A Panel Mount Series:



20A Panel Mount Series:



NOTE: The 20 ampere single pole holder is designed to accept all fuse ratings up to 20 amperes.

20 ampere fuseholders should be spaced 12.7mm (0.50") apart when loaded to maximum capacity, center to center to insure proper heat dissipation under normal operation.

Heatsinking may be required for operation in higher ambient temperatures or alternate configurations.

All terminals dimensions should be taken with fuse installed.

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