

# SURFACE MOUNT FUSES

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## THIN-FILM SURFACE MOUNT

### 1206 SMF Very Fast-Acting Thin-Film Type 429 Series



- The 1206 SMF is an extremely small, low profile design (1206 chip size) utilizing thin-film technology to achieve precise control of electrical characteristics.
- New one-piece element/termination design assures extra reliability by eliminating the need for soldering, welding or other joining operations in the manufacture of the fuse.
- Semi-rigid substrate eliminates the potential for thermal shock fractures and decreases the risk of mechanical damage during pick and place operations.

#### ELECTRICAL CHARACTERISTICS:

% of Ampere Rating	Opening Time at 25°C
100%	4 hours, <b>Minimum</b>
200%	5 seconds, <b>Maximum</b>
300%	0.2 seconds, <b>Maximum</b>

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATINGS:

0.125 – 3A 50 amperes at rated voltage, VAC/VDC  
4 – 7A 35 amperes at rated voltage, VAC/VDC

#### ENVIRONMENTAL SPECIFICATIONS:

**Operating Temperature:** –55°C to 125°C.

**Vibration:** Withstands 10–55 Hz per MIL-STD-202F, Method 201A and 10-2000 Hz at 20 G's per MIL-STD-202F, Method 204D, Condition D.

**Insulation Resistance (After Opening):** Greater than 10 KOhm.

**Resistance to Soldering Heat:** Withstands 60 seconds above 200°C up to 260°C, maximum.

**Thermal Shock:** Withstands 5 cycles of –55° to 125°C.

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Epoxy Substrate  
Terminations: Copper/Nickel/Tin-Lead (95/5)  
Cover Coat: Conformal Coating

#### Soldering Parameters:

Wave Solder — 260°C, 10 seconds maximum  
Reflow Solder — 260°C, 30 seconds maximum

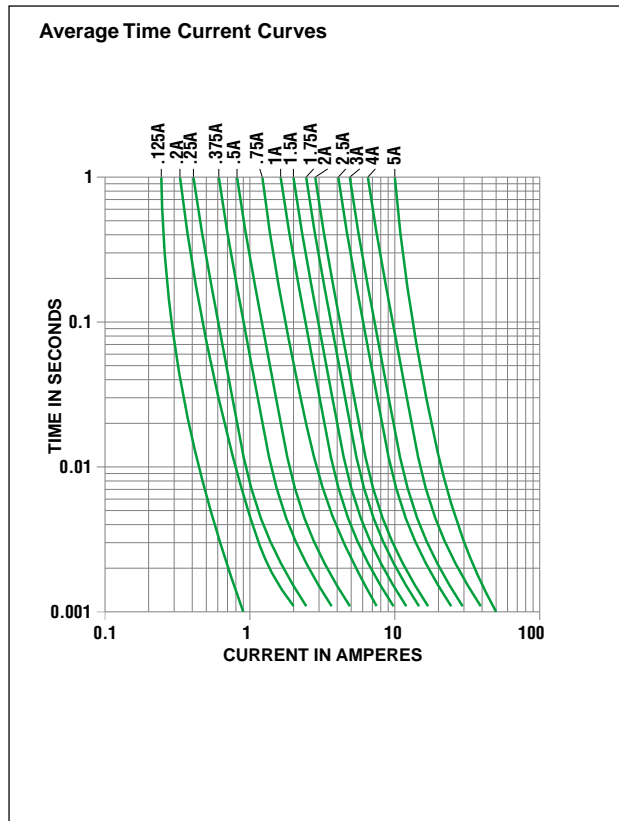
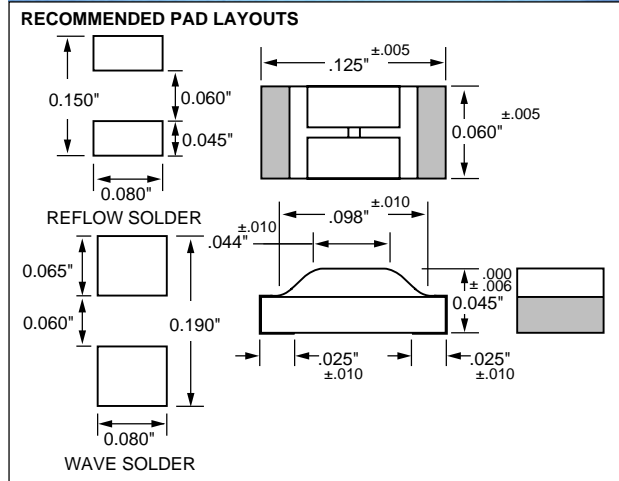
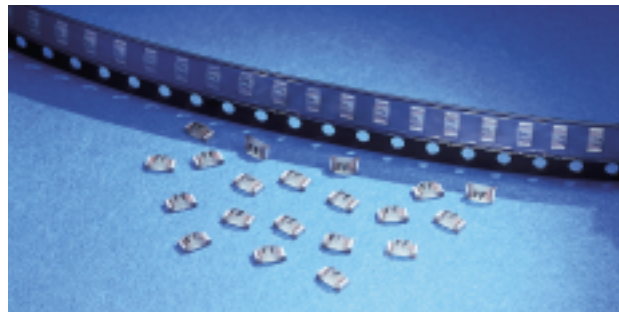
**PACKAGING SPECIFICATIONS:** 8mm Tape and Reel per EIA-RS481-2 (IEC 286, part 3); 3,000 per reel, add packaging suffix, WR.

#### PATENTED

#### ORDERING INFORMATION:

Catalog Number	Ampere Rating	Marking Code	Nominal Voltage Rating	Nominal Resistance Cold Ohms <sup>1</sup>	Nominal Voltage Drop (V) <sup>2</sup>	Melting I <sup>2</sup> t (A <sup>2</sup> Sec.) <sup>3</sup>
429.125	1/8	FB	125	2.30000	0.200	0.00020
429.200	2/10	FC	125	0.93800	0.175	0.00055
429.250	1/4	FD	125	0.62500	0.160	0.00100
429.375	3/8	FE	125	0.37500	0.138	0.00280
429.500	1/2	FF	63	0.24050	0.130	0.0060
429.750	3/4	FG	63	0.13700	0.120	0.0170
429.001	1	FH	63	0.09950	0.115	0.035
429.1.25	1¼	FJ	63	0.07475	0.108	0.065
429.01.5	1½	FK	63	0.06250	0.101	0.125
429.1.75	1¾	FL	63	0.05000	0.096	0.150
429.002	2	FN	63	0.03975	0.093	0.230
429.02.5	2½	FO	32	0.03065	0.087	0.50
429.003	3	FP	32	0.02625	0.080	0.70
429.004	4	FS	24	0.01926	0.070	1.5
429.005	5	FT	24	0.01375	0.065	2.7
429.007	7	FU	24	0.00925	0.060	3.6

<sup>1</sup> Measured at 10% of rated current, 25°C. <sup>2</sup> Measured at 100% of rated current, 25°C. <sup>3</sup> Measured at rated voltage.



## THIN-FILM SURFACE MOUNT

### 1206 SMF Slo-Blo® Thin-Film Fuse 430 Series



- Time delay feature withstands high in-rush 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:

% of Ampere Rating	Opening Time @ 25°C
100%	4 hours, <b>Minimum</b>
200%	1 sec., <b>Min.</b> ; 120 sec., <b>Max.</b>
300%	0.1 sec., <b>Min.</b> ; 3 sec., <b>Max.</b>
800%	0.002 sec., <b>Min.</b> ; .05 sec., <b>Max.</b>

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATINGS:

0.5A - 1.5A	50 amperes at 63 VAC/VDC
2A	35 amperes at 63 VAC/VDC
3A	50 amperes at 32 VAC/VDC

#### ENVIRONMENTAL SPECIFICATIONS:

##### Operating Temperature Range:

-55°C to +125°C

##### Vibration:

Withstands 10-55 Hz per MIL-STD-202F, Method 201A and 10-2000 Hz at 20 G's per MIL-STD-202F, Method 204D, Condition D.

##### Insulation Resistance (after opening):

Greater than 10kΩ.

##### Resistance to Soldering Heat:

Withstands 60 seconds above 200°C up to 260°C, maximum.

##### Thermal Shock:

Withstands 5 cycles of -50°C to +125°C.

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Epoxy Substrate  
Terminations: Copper/Nickel/Tin-Lead (95/5)  
Cover Coat: Conformal Coating

#### Soldering Parameters:

Wave Solder: 260°C, 10 seconds maximum

Reflow Solder: 260°C, 30 seconds maximum

**PACKAGING SPECIFICATIONS:** 8mm Tape and Reel per EIA-RS481-2 (IEC 286, part 3); 3,000 per reel, add packaging suffix, WR.

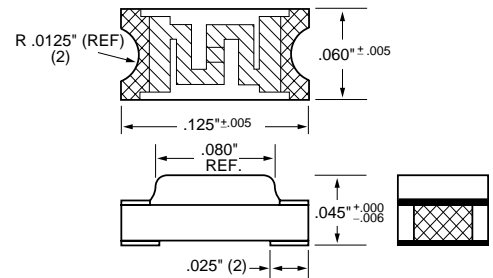
#### PATENTED

#### ORDERING INFORMATION:

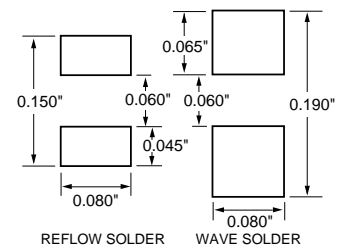
Catalog Number	Amperage Rating (A)	Marking Code	Voltage Rating (V)	Nom. Cold Resistance (Ω) <sup>1</sup>	Nominal Voltage Drop (V) <sup>2</sup>	Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec)
0430.500	0.5	TF	63	.250	.126	0.045
0430.001	1.0	TH	63	.097	.094	0.239
0430.015	1.5	TK	63	.056	.085	0.607
0430.002	2.0	TN	63	.039	.078	1.025
0430.003	3.0	TP	32	.020	.073	1.65

<sup>1</sup>Measured at 10% of rated current, 25°C.

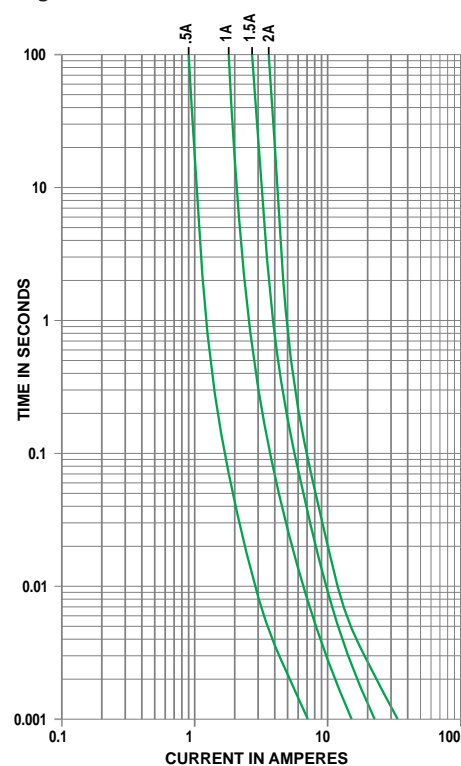
<sup>2</sup>Measured at 100% of rated current, 25°C.



#### RECOMMENDED MOUNTING PAD DIMENSIONS - INCHES:



#### Average Time Current Curves



## SURFACE MOUNT

### 0603 Very Fast-Acting Thin-Film Type 431 Series



Super-small size saves valuable board space while providing high power density. Ideal for circuit protection of disk drives, PCMCIA cards and cellular phones.

#### ELECTRICAL CHARACTERISTICS:

% of Ampere Rating	Opening Time at 25°C
100%	4 hours, <b>Minimum</b>
200%	5 seconds, <b>Maximum</b>
300%	0.2 seconds, <b>Maximum</b>

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATINGS:

.25–1A 50 amperes at 32 VAC/VDC  
1–5A 35 amperes at 32 VAC/VDC

#### ENVIRONMENTAL SPECIFICATIONS:

**Operating Temperature:** –55°C to 125°C.

**Vibration:** Withstands 10-55 HZ per MIL-STD-202F, Method 201A and 10-2000 HZ at 20 G's per MIL-STD-202F, Method 204D, Condition D.

**Insulation Resistance (After Opening):** Greater than 500,000 ohms.

**Resistance To Soldering Heat:** Withstands 60 seconds above 200°C up to 260°C, maximum.

**Thermal Shock:** Withstands 5 cycles of –50°C to 125°C.

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Epoxy Substrate  
Terminations: Copper/Nickel/Tin-Lead (95/5)  
Cover Coat: Conformal Coating

#### Soldering Parameters:

Wave Solder — 260°C, 10 seconds maximum  
Reflow Solder— 260°C, 30 seconds maximum

**PACKAGING SPECIFICATIONS:** 8mm Tape and Reel per EIA-RS481 (IEC 286, part 3); 5,000 per reel, add packaging suffix, NR.

#### PATENTED

#### ORDERING INFORMATION:

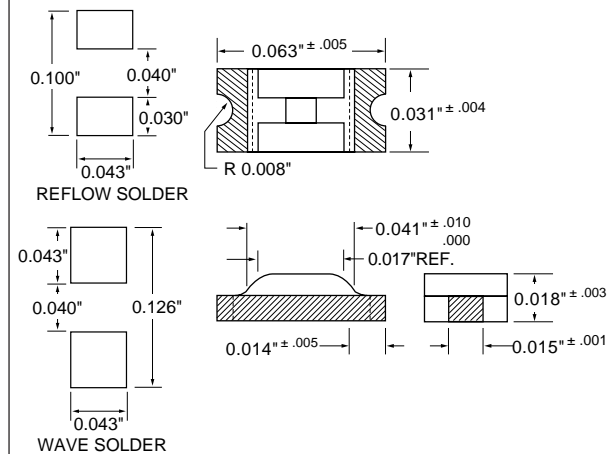
Catalog Number	Ampere Rating	Voltage Rating	Nominal Resistance Cold Ohm <sup>1</sup>	Nominal Voltage Drop (V) <sup>2</sup>	Melting I <sup>2</sup> t (A <sup>2</sup> Sec.)
431.250	1/4	32	0.375	0.130	0.0030
431.375	3/8	32	0.265	0.084	0.0053
431.500	1/2	32	0.193	0.120	0.0087
431.750	3/4	32	0.114	0.110	0.0171
431.001	1	32	0.072	0.100	0.0210
431.01.5	1½	32	0.048	0.082	0.0696
431.002	2	32	0.036	0.077	0.104
431.02.5	2½	32	0.028	0.089	0.175
431.003	3	32	0.023	0.080	0.198
431.03.5	3½	32	0.019	0.090	0.265
431.004	4	32	0.017	0.100	0.420
431.005	5	32	0.013	0.107	0.600

<sup>1</sup>Measured at 10% of rated current, 25°C.

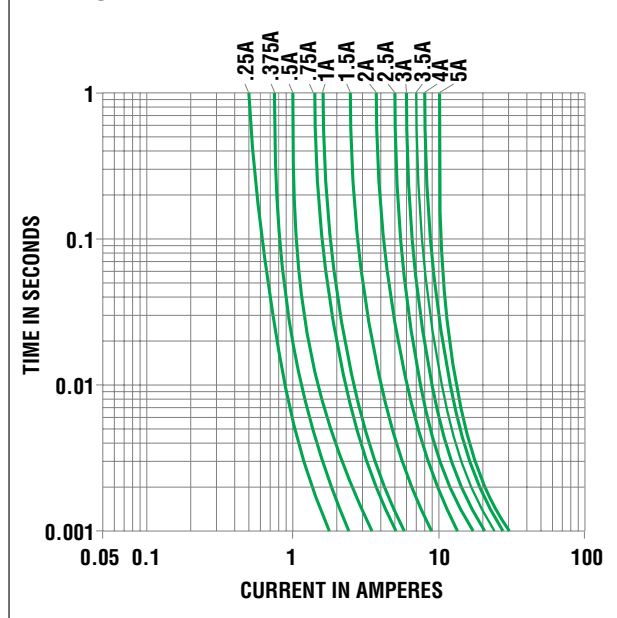
<sup>2</sup>Measured at 100% of rated current, 25°C.



#### Reference Dimensions:



#### Average Time Current Curves



## SMTelecom® Fuse 436 Series



- Surface mount overcurrent protection from lightning and power cross.
- Meets UL 1459/1950 power cross requirements stand alone.
- Ideal for use in telecommunication equipment including modems, fax machines, desk top phones, answering machines and line cards.
- UL recognized, with a 250 V operating voltage.
- Top side marking allows visual verification of ampere rating.
- Complies with Bellcore GR-1089-CORE and FCC 47 part 68 Surge Specifications.

### ELECTRICAL CHARACTERISTICS:

% of Ampere Rating	Opening Time
100%	4 Hours, <b>Minimum</b>
200%	5 Seconds, <b>Min.</b> ; 30 Seconds, <b>Max.</b>

### Short Circuit Capabilities:

**UL 1459 / UL 1950 3rd. Edt.**

40 Amperes @ 600 VAC

7 amperes @ 600 VAC

2.2 amperes @ 600 VAC

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA .

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

### INTERRUPTING RATINGS:

10,000 amperes @ 125V

100 amperes @ 250V

### ENVIRONMENTAL SPECIFICATIONS:

Operating Temperature Range: -55°C to +125°C

### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Melamine Substrate

Terminations: Copper/Nickel/Tin-Lead (95/5)

### Soldering Parameters:

Reflow Solder — 250°C, 10 sec. maximum.

Wave Solder — Not recommended.

**PACKAGING SPECIFICATIONS:** 24mm Tape and Reel per EIA-RS481-2 (IEC 286, part 3); 2,000 per reel, add packaging suffix, PR.

### PATENTED

### ORDERING INFORMATION:

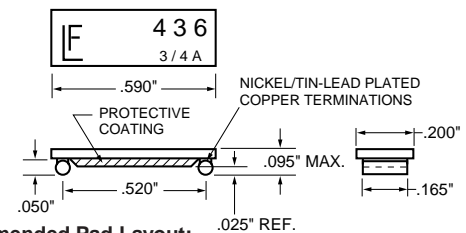
Catalog Number	Ampere Rating (A)	Voltage Rating (V)	Nominal Cold Resistance (Ω)	Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec.)
0436.750	3/4	250	0.850	1.143
0436001.	1	250	0.475	2.606
04361.25	1 1/4	250	0.305	3.658
043601.5	1 1/2	250	0.210	5.921
043601.6	1 9/10	250	0.165	13.500

### PERFORMANCE CHARACTERISTICS:

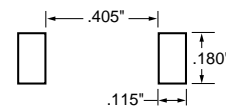
Catalog Number	FCC 47 Part 68				Bellcore GR-1089-CORE First Level Lightning	
	Longitudinal Surge 10x160µSec. (1500 V)		Metallic Surge 10x560µSec. (800 V)		10x1000µSec. (1000 V)	2x10µSec. (2500 V)
Repetitions	50	2	50	2	50	20
0436.750	82 A	88 A	29 A	32 A	22 A	225A
0436001.	102 A	117 A	44 A	48 A	37 A	350A
04361.25	120 A	135 A	87 A	95 A	56 A	425A
043601.5	175 A	200 A	100 A	115 A	80 A	500A
043601.6	200 A	200 A	134 A	156 A	100 A	500A



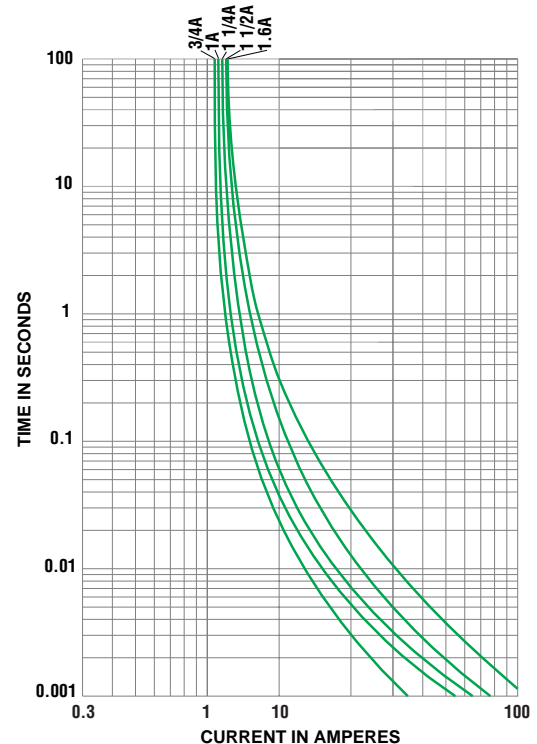
### Reference Dimensions



### Recommended Pad Layout:



### Average Time Current Curves



## SUBMINIATURE SURFACE MOUNT

### NANO<sup>2</sup>® SMF Very Fast-Acting Type Fuse



The Nano<sup>2</sup> SMF Fuse is a very small, square surface mount fuse that is also available in a surface mount holder.

#### ELECTRICAL CHARACTERISTICS:

% of Ampere Rating	Ampere Rating	Opening Time
100%	1/16–15	4 hours, <b>Minimum</b>
200%	1/16–10	5 seconds, <b>Maximum</b>
	12–15	20 seconds, <b>Maximum</b>

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA. Approved by MITI from 1 through 5 amperes.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATINGS:

1/16 – 8A	50 amperes at 125 VAC/VDC 300 amperes at 32 VDC
10A	35 amperes at 125 VAC/50 amperes at 125 VDC 300 amperes at 32 VDC
12A – 15A	50 amperes at 65 VAC/VDC 300 amperes at 24 VDC

#### ENVIRONMENTAL SPECIFICATIONS:

**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).

**Salt Spray:** MIL-STD-202, Method 101, Test Condition B.

**Insulation Resistance (After Opening):** MIL-STD-202, Method 302, Test Condition A, (10,000 ohms minimum).

**Resistance to Soldering Heat:** MIL-STD-202, Method 210, Test Condition F (20 sec. at 260°C).

**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).

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Ceramic

Terminations: Tin-Lead Alloy or Silver Plated Brass Caps.

#### Soldering Parameters:

Wave Solder — 260°C, 10 seconds maximum

Reflow Solder — 260°C, 30 seconds maximum

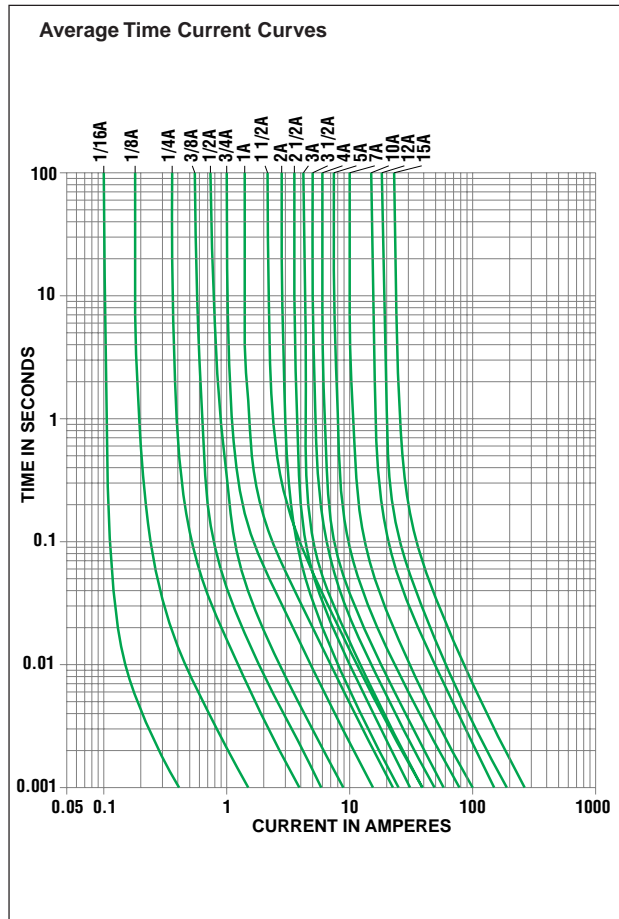
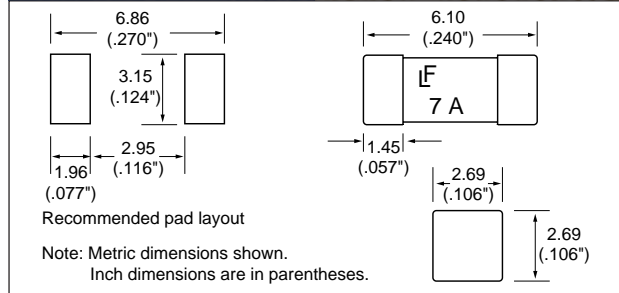
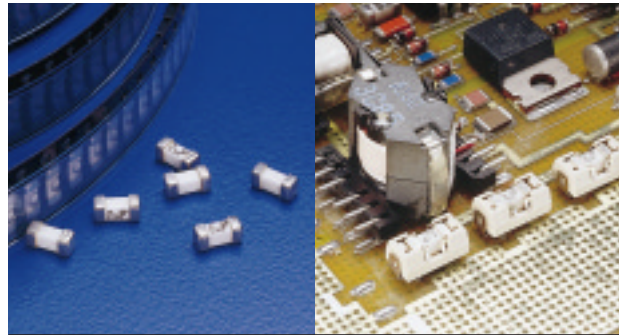
**Solderability:** MIL-STD-202, Method 208.

**PACKAGING SPECIFICATIONS:** 12mm Tape and Reel per EIA-RS481 (IEC 286, part 3); 1,000 per reel, add packaging suffix, MR.

#### PATENTED

#### ORDERING INFORMATION:

Tin-Lead Plated Catalog #	Silver Plated Catalog #	Ampere Rating	Voltage Rating	Nominal Resistance Cold Ohms	Nominal Melting I <sup>2</sup> t A <sup>2</sup> Sec.
–	R451.062	1/16	125	5.50	0.00019
–	R451.125	1/8	125	1.70	0.00286
R451.250	0453.250	1/4	125	1.05	0.01126
R451.375	0453.375	3/8	125	0.610	0.0425
R451.500	0453.500	1/2	125	0.420	0.0795
R451.750	0453.750	3/4	125	0.245	0.185
R451 001.	0453 001.	1	125	0.153	0.459
R451 01.5	0453 01.5	1 1/2	125	0.0630	0.853
R451 002.	0453 002.	2	125	0.0367	0.53
R451 02.5	0453 02.5	2 1/2	125	0.0286	1.029
R451 003.	0453 003.	3	125	0.0227	1.65
R451 03.5	0453 03.5	3 1/2	125	0.0200	2.469
R451 004.	0453 004.	4	125	0.0160	3.152
R451 005.	0453 005.	5	125	0.0125	5.566
R451 007.	0453 007.	7	125	0.0090	10.32
R451 010.	0453 010.	10	125	0.0056	26.46
R451 012.	0453 012.	12	65	0.0049	47.97
R451 015.	0453 015.	15	65	0.0037	97.82



Refer to pg. 102 for SMF Omni-Blok® Holder, Series 154 000.

## SUBMINIATURE SURFACE MOUNT

### NANO<sup>2</sup>® SMF Slo-Blo® Type Fuse



The very small NANO<sup>2</sup> Fuse with time delay performance characteristics. 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.

#### ELECTRICAL CHARACTERISTICS:

% of Ampere Rating	Opening Time
100%	4 hours, <b>Minimum</b>
200%	1 second, <b>Min.</b> ; 60 seconds, <b>Max.</b>
300%	0.2 seconds, <b>Min.</b> ; 3 seconds, <b>Max.</b>
800%	0.02 seconds, <b>Min.</b> ; 0.1 seconds, <b>Max.</b>

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATINGS:

50 amperes at 125 VAC

50 amperes at 125 VDC

300 amperes at 32 VDC

#### ENVIRONMENTAL SPECIFICATIONS:

**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, .06 in. total excursion).

**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).

**Resistance to Soldering Heat:** MIL-STD-202, Method 210, (3 sec. at 260°C).

**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).

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Ceramic  
Terminations: Tin-Lead Alloy or Silver Plated Brass Caps.

#### Soldering Parameters:

Wave Solder — 260°C, 3 seconds maximum

Reflow Solder — 230°C, 30 seconds maximum

**Solderability:** MIL-STD-202, Method 208.

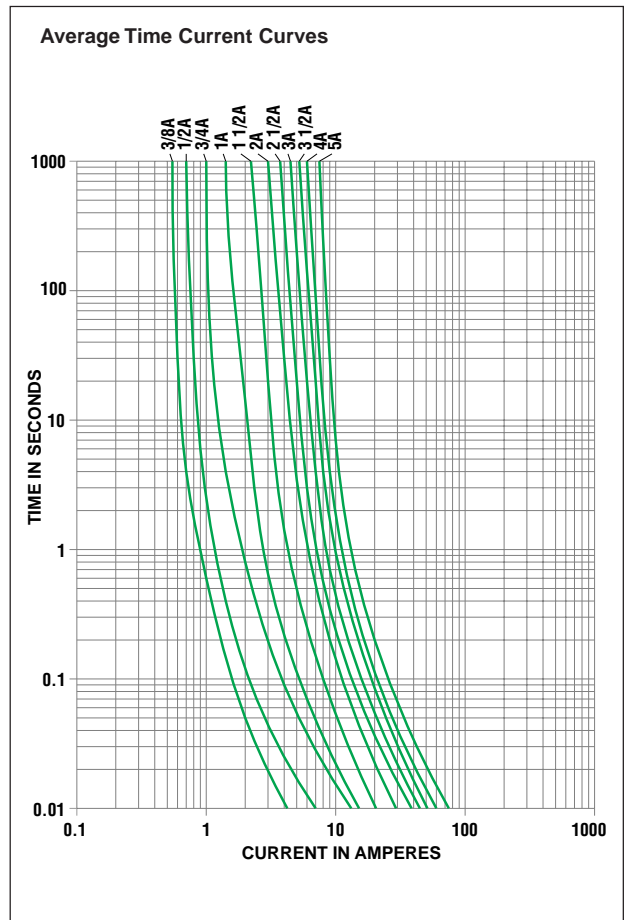
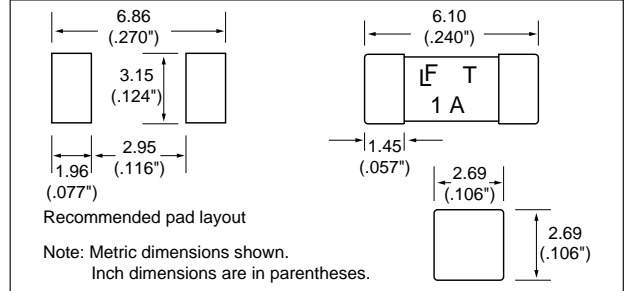
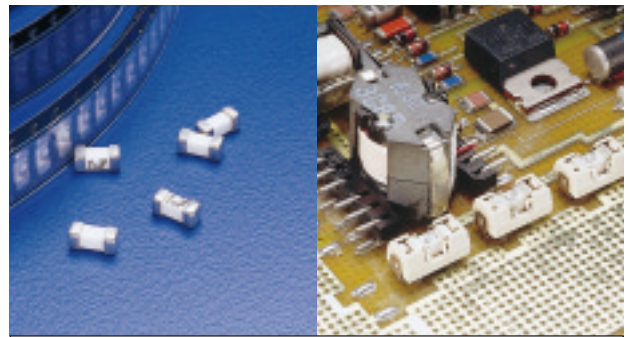
**PACKAGING SPECIFICATIONS:** 12mm Tape and Reel per EIA-RS481 (IEC 286, part 3); 1,000 per reel.

**Marking:** The 452/454 series Slo-Blo fuse marking includes the letter "T" to designate time delay characteristics.

#### PATENTED

#### ORDERING INFORMATION:

Tin-Lead Plated Catalog #	Silver Plated Catalog #	Ampere Rating	Voltage Rating	Nominal Resistance Cold Ohms	Nominal Melting I <sup>2</sup> t A <sup>2</sup> Sec.
R452.375	0454.375	3/8	125	1.60	0.101
R452.500	0454.500	1/2	125	0.940	0.240
R452.750	0454.750	3/4	125	0.460	0.904
R452 001.	0454 001.	1	125	0.270	1.98
R452 01.5	0454 01.5	1 1/2	125	0.116	3.65
R452 002.	0454 002.	2	125	0.0760	8.20
R452 02.5	0454 02.5	2 1/2	125	0.0540	15.0
R452 003.	0454 003.	3	125	0.0414	20.16
R452 03.5	0454 03.5	3 1/2	125	0.0224	26.53
R452 004.	0454 004.	4	125	0.0186	34.40
R452 005.	0454 005.	5	125	0.0136	53.72



Refer to pg. 102 for SMF Omni-Blok® Holder, Series 154 000T.

## SUBMINIATURE SURFACE MOUNT

### PICO® SMF Very Fast-Acting Type Fuse 459 Series



The PICO® SMF Very Fast-Acting Fuse provides high performance in a rectangular package suitable for reflow and wave soldering methods.

#### ELECTRICAL CHARACTERISTICS:

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

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATINGS:

50 amperes at 125 VAC.  
300 amperes at 125 VDC.

#### ENVIRONMENTAL SPECIFICATIONS:

**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, .06 in. total excursion).

**Salt Spray:** MIL-STD-202, Method 101, Test Condition B (48 hrs.).

**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 F (10 sec. at 260°C).

**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°).

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Molded Thermoplastic  
Terminations: Tin-Lead Plated Copper

#### Soldering Parameters:

Wave Solder — 260°C, 10 seconds maximum  
Reflow Solder — 260°C, 30 seconds maximum

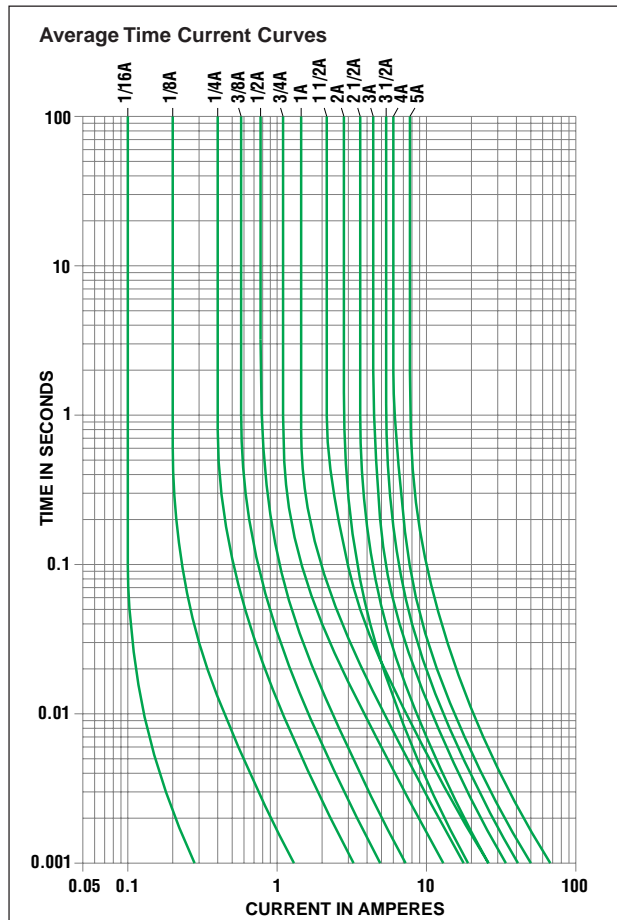
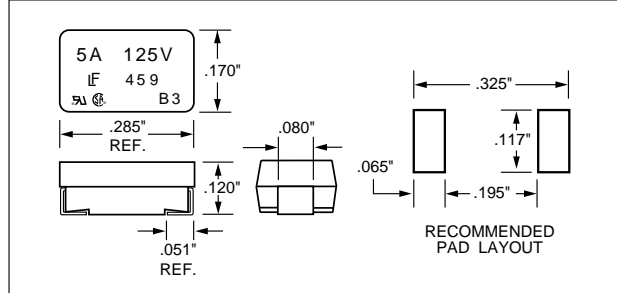
**Solderability:** MIL-STD-202, Method 208.

**PACKAGING SPECIFICATIONS:** 12mm Tape and Reel per EIA-RS481 (IEC 286, part 3); 500 per reel, add packaging suffix, UR.

#### PATENTED

#### ORDERING INFORMATION:

Catalog Number	Ampere Rating	Voltage Rating	Nominal Resistance Cold Ohms	Nominal Melting I <sup>2</sup> t A <sup>2</sup> Sec.
R459.062	1/16	125	7.0	0.000075
R459.125	1/8	125	1.70	0.00163
R459.250	1/4	125	0.665	0.0106
R459.375	3/8	125	0.395	0.0254
R459.500	1/2	125	0.280	0.0546
R459.750	3/4	125	0.175	0.155
R459.001	1	125	0.125	0.281
R459.01.5	1½	125	0.0800	0.650
R459.002	2	125	0.0468	0.421
R459.02.5	2½	125	0.0350	0.721
R459.003	3	125	0.0290	1.23
R459.03.5	3½	125	0.0240	1.65
R459.004	4	125	0.0200	2.35
R459.005	5	125	0.0155	3.90





## SUBMINIATURE SURFACE MOUNT

### PICO® SMF Slo-Blo® Type Fuse 460 Series



The PICO® SMF Slo-Blo® Fuse product provides Pico® fuse reliability and performance in a standard rectangular surface mount package.

#### ELECTRICAL CHARACTERISTICS:

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

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA. Approved by MITI from 1 through 5 amperes.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATINGS:

50 amperes at 125 VAC.  
50 amperes at 125 VDC.

#### ENVIRONMENTAL SPECIFICATIONS:

**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, 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, (3 sec. at 260°C).

**Thermal Shock:** MIL-STD-202, Method 107, (-65 to 125°C).

**Moisture Resistance:** MIL-STD-202, Method 106, High Humidity (90-98 RH), Heat (65°C).

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Molded Thermoplastic  
Terminations: Tin-Lead Plated Copper

#### Soldering Parameters:

Wave Solder — 260°C, 3 seconds maximum  
Reflow Solder — 230°C, 30 seconds maximum

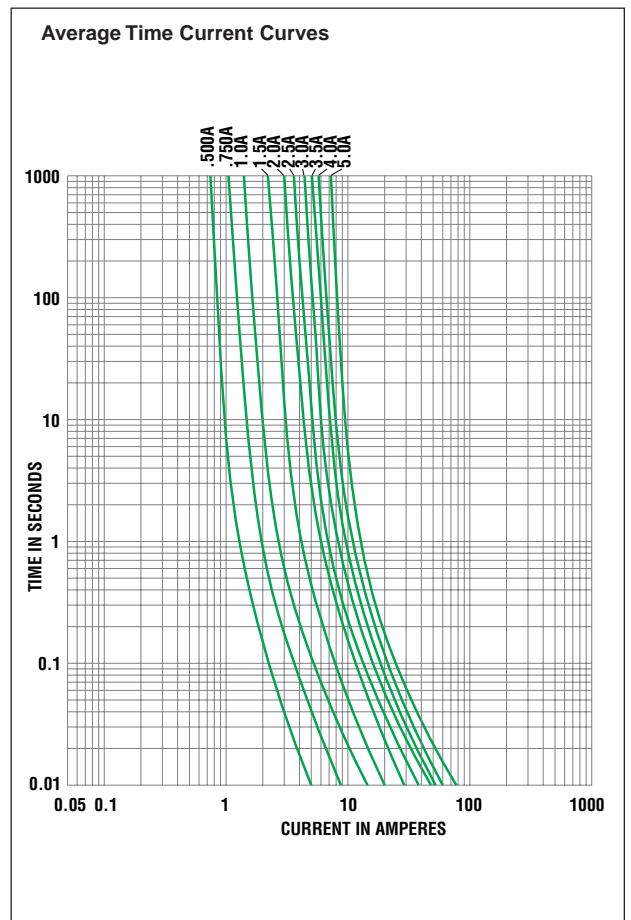
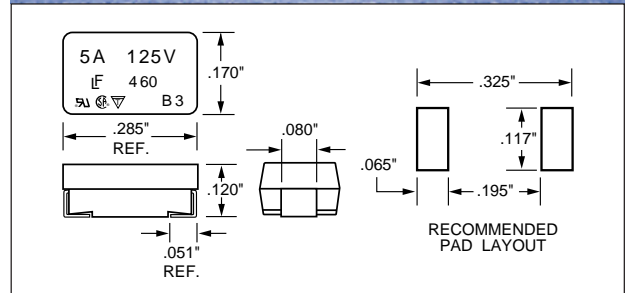
**Solderability:** MIL-STD-202, Method 208.

**PACKAGING SPECIFICATIONS:** 12mm Tape and Reel per EIA-RS481 (IEC 286, part 3); 500 per reel, add packaging suffix, UR.

#### PATENTED

#### ORDERING INFORMATION:

Catalog Number	Ampere Rating	Voltage Rating	Nominal Resistance Cold Ohms	Nominal Melting I <sup>2</sup> t A <sup>2</sup> Sec.
R460.500	1/2	125	1.19	0.210
R460.750	3/4	125	0.497	0.760
R460.001	1	125	0.280	2.01
R460.01.5	1½	125	0.116	3.94
R460.002	2	125	0.071	7.60
R460.02.5	2½	125	0.052	13.0
R460.003	3	125	0.038	21.0
R460.03.5	3½	125	0.024	26.8
R460.004	4	125	0.0194	35.0
R460.005	5	125	0.0133	54.8



## SUBMINIATURE SURFACE MOUNT & DIP TYPES

### FLAT-PAK® Fast Acting Fuse



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.

#### ELECTRICAL CHARACTERISTICS:

% of Ampere Rating	Opening Time
100%	4 hours, <b>Minimum</b>
200%	2 seconds, <b>Maximum</b>

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATING:

50 amperes at 250 VAC.

#### ENVIRONMENTAL SPECIFICATION:

**Operating Temperature:** -55°C to 125°C.

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Thermoplastic

Terminations: Tin/Lead Plated Copper

#### Soldering Parameters:

Wave Solder — 260°C, 3 seconds maximum.

Reflow Solder — 215°C, 30 seconds maximum.

**Solderability:** MIL-STD-202, Method 208.

**Cleaning:** Board washable in most common solvents.

#### PACKAGING SPECIFICATIONS:

SMF Fuses — 24mm Tape and Reel per EIA-RS481 (IEC 286, part 3); 500 per reel.

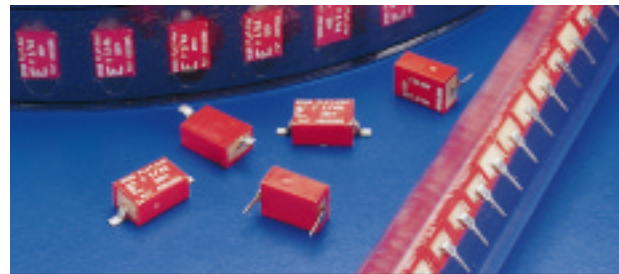
DIP Fuses — Antistatic magazine, 100 per magazine.

#### PATENTED

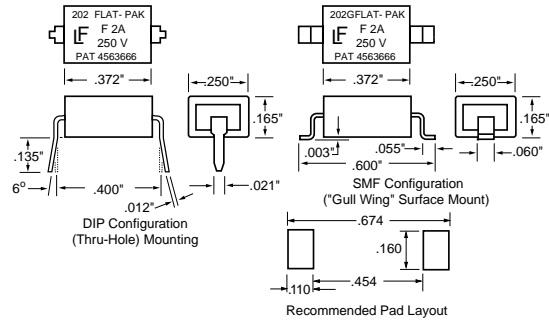
#### ORDERING INFORMATION

Catalog Number	Catalog <sup>1</sup> Number	Ampere Rating	Voltage Rating	Nominal Resistance Cold Ohms	Nominal Melting I <sup>2</sup> t A <sup>2</sup> Sec.
202.062	202.062G	1/16	250	7.90	0.000220
202.125	202.125G	1/8	250	2.45	0.00180
202.250	202.250G	1/4	250	0.880	0.0147
202.500	202.500G	1/2	250	0.298	0.0363
202.750	202.750G	3/4	250	0.166	0.0980
202.001	202.001G	1	250	0.119	0.192
202.01.5	202.01.5G	1½	250	0.0701	0.540
202.002	202.002G	2	250	0.0469	1.07
202.02.5	202.02.5G	2½	250	0.0455	1.76
202.003	202.003G	3	250	0.0327	1.71
202.004	202.004G	4	250	0.0244	3.00
202.005	202.005G	5	250	0.0174	4.68

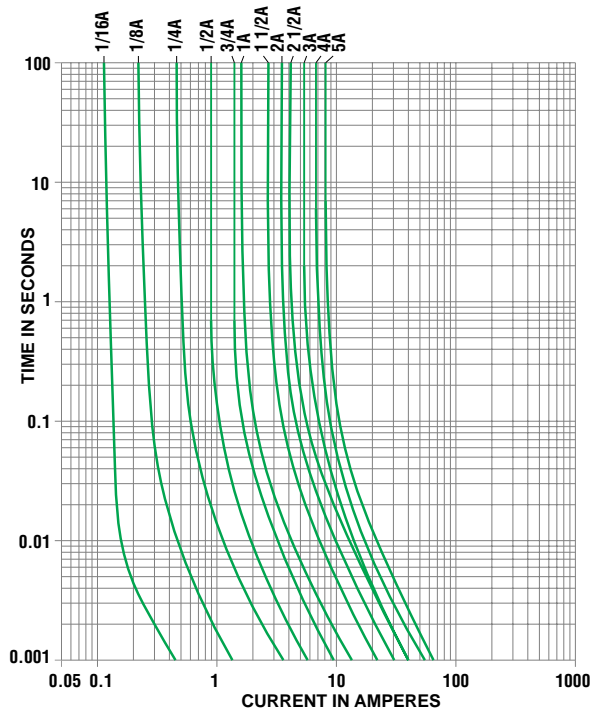
<sup>1</sup>SMF fuse marking includes the letter "G" next to the series number indicating "Gull-Wing".



#### Reference Dimensions:



#### Average Time Current Curves



## SUBMINIATURE SURFACE MOUNT & DIP TYPES

### FLAT-PAK® Slo-Blo® Fuse



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.

#### ELECTRICAL CHARACTERISTICS:

% of Ampere Rating	Opening Time
100%	4 hours, <b>Minimum</b>
200%	1 second, <b>Minimum</b>
	30 seconds, <b>Maximum</b>

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA.

**AGENCY FILE NUMBERS:** UL E10480, CSA LR 29862.

#### INTERRUPTING RATING:

50 amperes at 250 VAC.

#### ENVIRONMENTAL SPECIFICATION:

**Operating Temperature:** -55°C to 125°C.

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Thermoplastic

Terminations: Tin/Lead Plated Copper

#### Soldering Parameters:

Wave Solder — 260°C, 3 seconds maximum.

Reflow Solder — 215°C, 30 seconds maximum.

**Solderability:** MIL-STD-202, Method 208.

**Cleaning:** Board washable in most common solvents.

#### PACKAGING SPECIFICATIONS:

SMF Fuses — 24mm Tape and Reel per EIA-RS481 (IEC 286, part 3); 500 per reel.

DIP Fuses — Antistatic magazine, 100 per magazine.

#### PATENTED

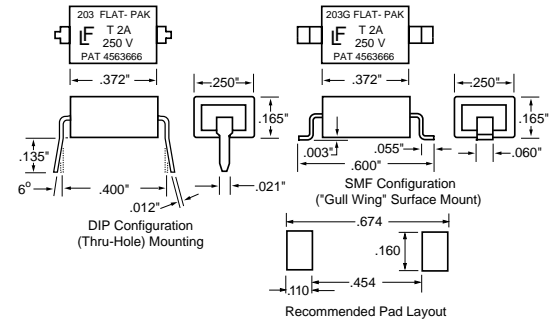
#### ORDERING INFORMATION

Catalog Number	Catalog <sup>1</sup> Number	Ampere Rating	Voltage Rating	Nominal Resistance Cold Ohms	Nominal Melting I <sup>2</sup> t A <sup>2</sup> Sec.
203.250	203.250G	1/4	250	1.36	0.0126
203.500	203.500G	1/2	250	0.433	0.112
203.750	203.750G	3/4	250	0.158	0.327
203.001	203.001G	1	250	0.0755	0.328
203.01.5	203.01.5G	1½	250	0.0390	0.850
203.002	203.002G	2	250	0.0345	1.70
203.02.5	203.02.5G	2½	250	0.0237	2.87
203.003	203.003G	3	250	0.0197	4.40
203.004	203.004G	4	250	0.0148	8.75
203.005	203.005G	5	250	0.0124	14.7

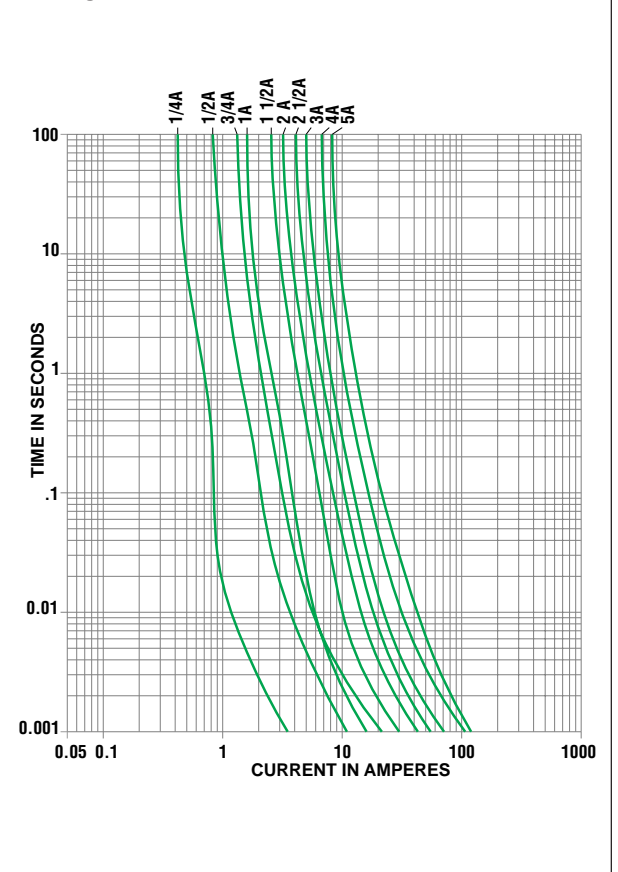
<sup>1</sup>SMF fuse marking includes the letter "G" next to the series number indicating "Gull-Wing".



#### Reference Dimensions:



#### Average Time Current Curves



## 350 VOLT SURFACE MOUNT FUSE

### EBF Fuse Fast-Acting Type 446 Series



- 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.

#### ELECTRICAL CHARACTERISTICS:

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

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and CSA Certified. Approved by MITI to 5 amperes.

**AGENCY FILE NUMBERS:** UL: E71611, CSA LR 29862.

#### INTERRUPTING RATINGS:

100 amperes at 350 VAC.

#### ENVIRONMENTAL SPECIFICATIONS:

**Operating Temperature:** -40°C to +125°C.

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Plastic Body  
Terminations: Silver Plated Zinc

#### Soldering Parameters:

Reflow Solder — 245°C, 5 seconds maximum.  
Wave Solder — Not recommended.

#### PACKAGING SPECIFICATIONS:

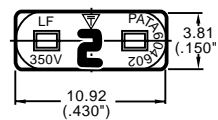
24mm Tape and Reel per EIA-RS481  
(Equivalent to IEC 286, part 3); 800 fuses per reel,  
add packaging suffix, ZR.

#### ORDERING INFORMATION:

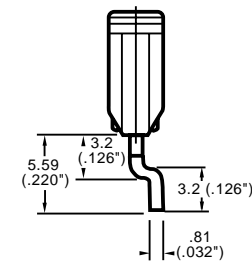
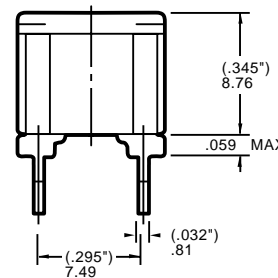
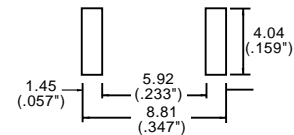
Catalog Number	Ampere Rating (A)	Voltage Rating (VAC)	Body Color	Nominal Cold Resistance(Ω)	Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec)
0446002.	2	350	Natural	0.0560	2.8
0446003.	3	350	Violet	0.0340	9.4
0446004.	4	350	Pink	0.0240	17
0446005.	5	350	Tan	0.0180	25
044607.5	7.5	350	Brown	0.0110	68
0446010.	10	350	Red	0.0073	93



#### Reference Dimensions (Inches):



#### Recommended Pad Layout:



#### Average Time Current Curves

