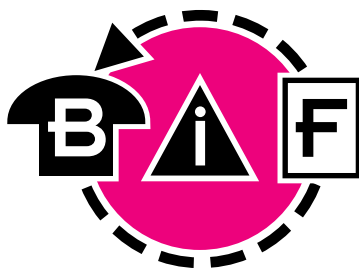


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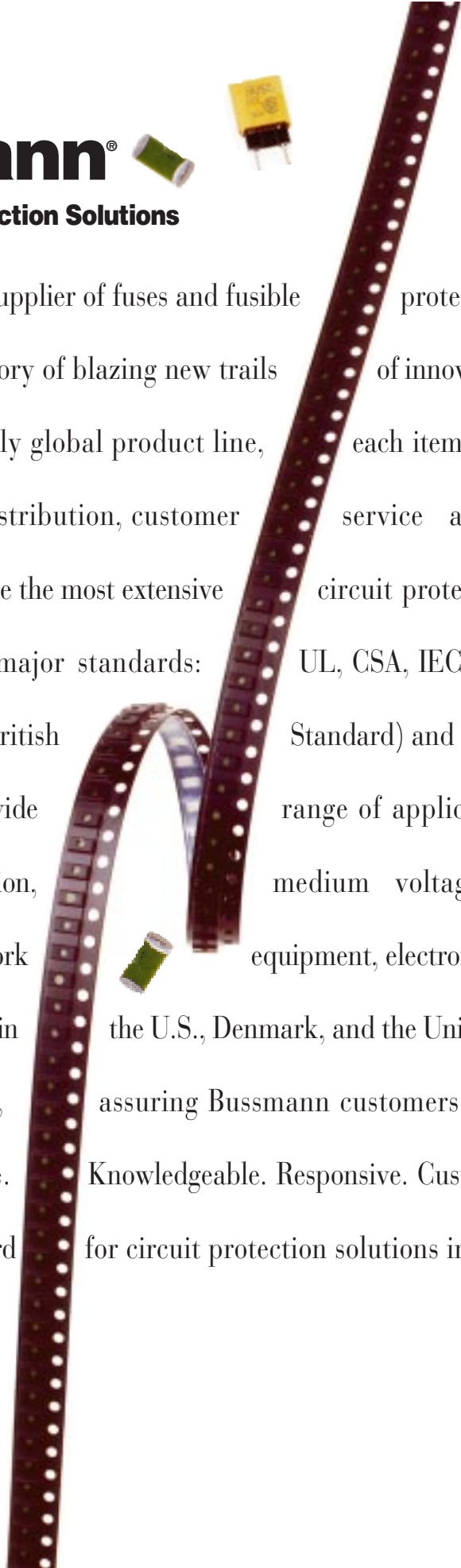
Bussmann®

Worldwide Circuit Protection Solutions

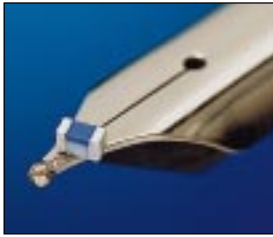
North America's leading supplier of fuses and fusible protection systems, Bussmann continues its 80-year history of blazing new trails of the industry's first truly global product line, worldwide network of distribution, customer service and technical support. Bussmann products include the most extensive circuit protection solutions approved for use in a variety of major standards:

both European (Din, British Standard) and North American (Ferrule) styled fuses for a wide range of applications: industrial motor protection, power conversion, telecommunications network equipment, electronics, and automotive. Our manufacturing operations in the U.S., Denmark, and the United Kingdom have earned ISO 9000 certification, assuring Bussmann customers only the utmost quality across every product line. Knowledgeable. Responsive. Customer focused. Bussmann continues to set the standard for circuit protection solutions in the global marketplace.

UL, CSA, IEC, ISO . . . Not to mention



Surface Mount Chip Fuse



1608FF

Voltage Rating: 24 VDC

Interrupting Rating: 35 Amperes

Physical Size:

EIA SOCM-1608-AC (Equivalent to 0603)

1.6 × 0.8 × 0.8mm

0.063 × 0.032 × 0.032 in.

Time-Current Characteristics:

Carry 100% rated current, 4 hours minimum. Open within 5 seconds at 250% rated current.

Agency Approvals:

UL Recognized, Std. 248-14, File E19180, Guide JDYX2

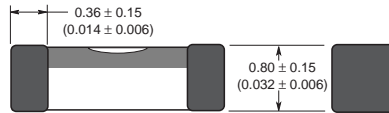
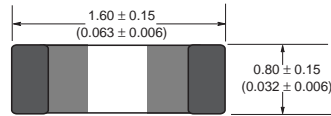
CSA Component Acceptance File 53787, Class 1422-30

General Information:

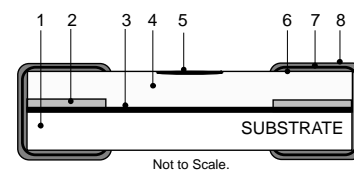
- Bussmann SMT Chip Fuses utilize thick and thin metal film technologies for superior fusing action and enhanced reliability.
- The fuse element is bonded to a ceramic substrate and encapsulated with glass, providing excellent short-circuit performance and environmental integrity. Predicted reliability of the 1608FF chip fuse is 30 times greater than that of the typical chip capacitor (consult Bussmann for details).
- Substrate and coating thermal expansion coefficients are closely matched to that of FR-4 epoxy-glass circuit board for superior solder joint reliability.
- The end terminations are over-plated with nickel and tin-lead.

Dimensional Data

Dimensions - mm (inches)



Construction



- Ceramic Substrate
- Silver Termination Pad
- Metal Film Fusible Element
- Fused Glass Cover (Color Coded)
- White Stripe (Only On Certain Ratings)
- Silver End Termination
- Nickel Barrier (5.1-10.2 μm)
- 90/10 Tin-Lead Plating (7.6-12.7 μm)

Packaging and Ordering Information:

Tape and Reel: Standard 8mm tape, in compliance with EIA-RS481 (equivalent to IEC 286, Part 3).

	1608FF	(See Table)
	Product Symbol	Rated Current

Package Code

TR = 3,000 pieces on tape on a 178mm reel.

TR1 = 15,000 pieces on tape on a 330mm reel.

SP = 50 pieces on tape in a plastic box.

Contact Bussmann if other package quantities are required.

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Part Number (XX=Package Code)	Current Rating (Amperes)	Color Code (Cover/Stripe)	Typ. Resistance @ ≤ 10% Rated Current (Ohms)	Typ. Voltage Drop @ Rated Current (Volts)	Typ. Melting Integral @ 35A (A² sec.)	Typ. Total Clearing Integral @ 35A (A² sec.)
xx/1608FF-250mA	0.25	Green	3.0	0.90	.000067	.000082
xx/1608FF-375mA	0.375	Green/White	2.0	0.80	.00015	.00017
xx/1608FF-500mA	0.5	Blue	0.9	0.54	.00055	.00058
xx/1608FF-750mA	0.75	Blue/White	0.51	0.45	.00132	.00137
xx/1608FF-1A	1	Brown	0.15	0.18	.0022	.0026
xx/1608FF-1.5A	1.5	Brown/White	0.068	0.12	.014	.015
xx/1608FF-2A	2	Black	0.042	0.11	.037	.038
xx/1608FF-2.5A	2.5	Black/White	0.029	0.09	.070	.078
xx/1608FF-3A	3	Violet	0.022	0.087	.095	.107
xx/1608FF-3.5A	3.5	Violet/White	0.018	0.08	.185	.190
xx/1608FF-4A	4	Yellow	0.014	0.08	.270	.272

General Notes:

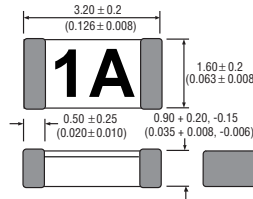
- AC interrupting rating, melting integral and total clearing integral measured at 32V, unity power factor.
- DC interrupting rating, melting integral and total clearing integral measured at 63V (250mA-3A) and 32V (4-5A), with a battery source.
- It is recommended that fuses be mounted with ceramic (white) side facing up.
- Contact Bussmann if higher ampere ratings are needed.
- Device designed to carry rated current for four hours minimum. An operating current of 80% or less of rated current is recommended, with further derating required at elevated ambient temperatures.



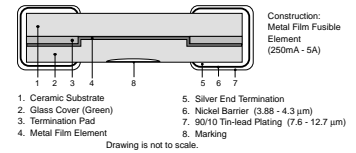
Surface Mount Chip Fuse



Dimensions - mm (inches)



Construction



3216FF

Fast Acting

Voltage Rating: 32 Volt AC, 63 Volt DC (250mA-3A)
32 Volt AC, 32 Volt DC (4-5A)

Interrupting Rating: 50 Amp AC/DC

Physical Size:

EIA SOCM-3216AC (Equivalent to 1206)
3.2 × 1.6 × 0.90mm
0.126 × 0.063 × 0.035 in.

Agency Approvals:

UL Recognized, Std. 248-14 (All Ratings), File E19180, Guide JDYX2
CSA Certified (1.5-3A), File 53787, Class 1422-01
CSA Component Acceptance (250-750mA, 1A, 4-5A)
File 53787, Class 1422-30

General Information:

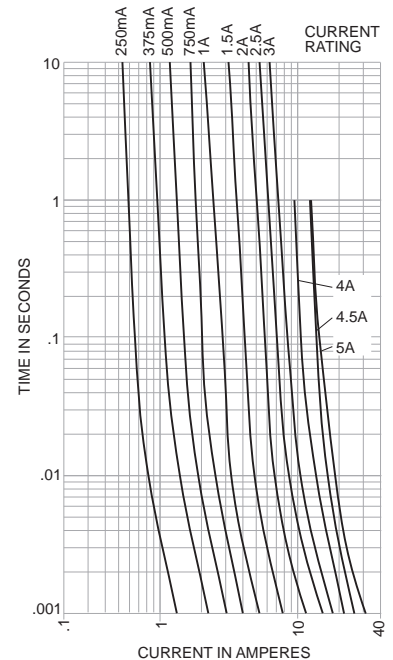
Bussmann SMT Chip Fuses utilize metal film and ultrasonic wire bond technologies for superior fusing action and enhanced reliability. The fuse element is bonded to a ceramic substrate and encapsulated with green-colored glass, providing excellent short-circuit performance and environmental integrity. The end terminations are over-plated with nickel and tin-lead.

Packaging & Ordering Information:

	3216FF	(See Table)
	Product Symbol	Rated Current
Package Code		
TR/ 3,000 pcs., on a 178mm reel, 8mm tape width		
SP/ 50 pcs. on tape in a plastic box		
TR1/ 15,000 pcs., on a 330mm reel, 8mm tape width		

Time-Current Characteristics:

Fast acting fuse: Will carry 100% of rated current for a minimum of 4 hours, and will open within 5 seconds at 250% of rated current (250mA-3A). The 4-5A fuses will open within 1 second at 350% of rated current.



CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Part Number	Current Rating (Ampere)	Mark Appearing On Part	Typical Melting Integral @ 50A (A ² * sec)		Typical Total Clearing Integral @ 50A (A ² * sec)		Typ. Resistance @ ≤10% Rated Current (Ohms)	Typ. Voltage Drop @ Rated Current (Volts)
			AC	DC	AC	DC		
<i>(XX=Package Code)</i>								
XX/3216FF-250mA	.250	.25	.00016	.000084	.00017	.0001	4.50	1.4
XX/3216FF-375mA	.375	White Dot	.001	.0002	.0010	.0009	1.80	.73
XX/3216FF-500mA	.500	0.5	.0014	.0019	.0016	.0026	1.15	.66
XX/3216FF-750mA	.750	.75	.0033	.00095	.0033	.0042	.75	.63
XX/3216FF-1A	1	1	.012	.007	.014	.009	.168	.20
XX/3216FF-1.5A	1.5	1.5	.047	.029	.048	.034	.098	.18
XX/3216FF-2A	2	2	.116	.081	.136	.092	.063	.16
XX/3216FF-2.5A	2.5	2.5	.208	.171	.210	.198	.046	.14
XX/3216FF-3A	3	3	.426	.359	.507	.369	.037	.13
XX/3216FF-4A	4	4	.187	.164	.208	.168	.019	.11
XX/3216FF-4.5A	4.5	4.5	.546	.463	.550	.47	.014	.10
XX/3216FF-5A	5	5	.663	.619	.668	.623	.013	.09
XX/3216FF-6.5A	6.5	6.5	2.18	3.21	2.21	3.23	.0085	.076

General Notes:

1. AC interrupting rating, melting integral and total clearing integral measured at 32V, unity power factor.
2. DC interrupting rating, melting integral and total clearing integral measured at 63V (250mA-3A) and 32V (4-5A), with a battery source.
3. Voltage drop measured at 23 ± 3°C ambient temperature with the device mounted on a suitable circuit board trace.
4. It is recommended that fuses be mounted with ceramic (white) side facing up.
5. Device designed to carry rated current for four hours minimum. An operating current of 80% or less of rated current is recommended, with further derating required at elevated ambient temperatures.
6. Contact Bussmann if higher ampere ratings are needed.

BIF document: 3001



Surface Mount Chip Fuse w/125V AC/DC Rating



3216LV

Voltage Rating: 125V AC/DC

Interrupting Rating: 50 Amp AC/DC

Physical Size:

EIA SOCM-3216AC (Equivalent to 1206)

3.2 × 1.6 × 0.90mm

0.126 × 0.063 × 0.035 in.

Agency Approvals:

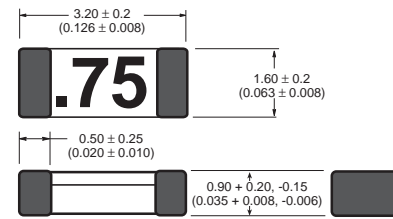
UL Recognized, Std. 248-14, File E19180, Guide JDYX2

CSA Component Acceptance, File 53787, Class 1422-30

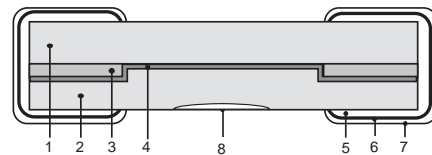
General Information:

- Bussmann SMT Chip Fuses utilize thick and thin metal film technologies for superior fusing action and enhanced reliability.
- The fuse element is bonded to a ceramic substrate and encapsulated with glass, providing excellent short-circuit performance and environmental integrity. Predicted reliability of the 3216LV chip fuse is 30 times greater than that of the typical chip capacitor (consult Bussmann for details).
- Substrate and coating thermal expansion coefficients are closely matched to that of FR-4 epoxy-glass circuit board for superior solder joint reliability.
- The end terminations are over-plated with nickel and tin-lead.

Dimensions - mm (inches)



Construction



Drawing is not to scale.

1. Ceramic Substrate
2. Glass Cover
3. Termination Pad
4. Metal Film Element
5. Silver End Termination
6. Nickel Barrier (5.1–10.2µm)
7. 90/10 Tin-lead Plating (7.6–12.7 µm)
8. Marking

Time-Current Characteristics:

Fast-acting fuse: Will carry 100% of rated current for a minimum of 4 hours, and will open within 5 seconds at 250% of rated current.

Packaging and Ordering Information:

- **Tape and Reel:** Standard 8mm tape, in compliance with EIA-RS481 (equivalent to IEC 286, Part 3).
- Fuses are orientated in embossed pockets with ceramic side facing up to facilitate proper mounting (See "Electrical Characteristics", General Note 4).

	3216LV	(See Table)
	Product Symbol	Rated Current

Package Code

TR = 3,000 pieces on tape on a 178mm reel.

TR1 = 15,000 pieces on tape on a 330mm reel.

SP = 50 pieces on tape in a plastic box.

Contact Bussmann if other package quantities are required.

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Part Number (XX=Package Code)	Current Rating (Ampere)	Mark Appearing On Part	Typical Melting Integral @ 50A (A ² * sec)		Typical Total Clearing Integral @ 50A (A ² * sec)		Typ. Resistance @ ≤ 10% Rated Current (Ohms)	Typ. Voltage Drop @ Rated Current (Volts)
			AC	DC	AC	DC		
XX/3216LV-250mA	.250	.25	.00016	.000084	.00017	.0001	4.50	1.4
XX/3216LV-375mA	.375	White Dot	.001	.0002	.0010	.0009	1.80	.73
XX/3216LV-500mA	.500	0.5	.0014	.0019	.0016	.0026	1.15	.66
XX/3216LV-750mA	.750	.75	.0033	.00095	.0033	.0042	.75	.63
XX/3216LV-1A	1	1	.020	.0084	.022	.0098	.52	.63
XX/3216LV-1.25A	1.25	White Δ	.035	.021	.038	.027	.40	.62
XX/3216LV-1.5A	1.5	1.5	.038	.024	.044	.033	.26	.49

General Notes:

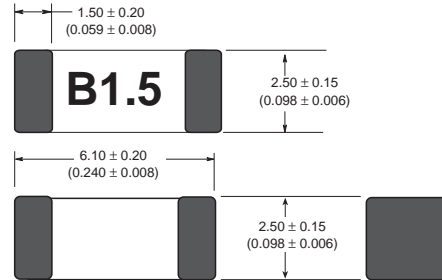
1. AC interrupting rating, melting integral and total clearing integral measured at 125V, unity power factor.
2. DC interrupting rating, melting integral and total clearing integral measured at 125V with a battery source.
3. Voltage drop measured at 23 ± 3°C ambient temperature with the device mounted on a suitable circuit board trace.
4. It is recommended that fuses be mounted with ceramic (white) side facing up.
5. Device designed to carry rated current for four hours minimum. An operating current of 80% or less of rated current is recommended, with further derating required at elevated ambient temperatures.
6. Contact Bussmann if higher ampere ratings are needed.



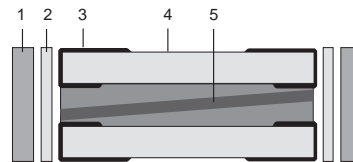
Surface Mount Time-Lag Fuse



Dimensions - mm (inches)



Construction



1. Brass end plate (one of two)*.
2. High temperature brazing alloy preform (one of two).
3. Silver metallization*.
4. Ceramic body.
5. Spiral wound fusible element.

*End terminations plated with Ni and 90/10 Sn/Pb after assembly.

Packaging and Ordering Information:

Tape and Reel: Standard 12mm tape, in compliance with EIA-RS481 (equivalent to IEC 286, Part 3).

	6125T	(See Table)
	Product Symbol	Rated Current

Package Code

TR = 1,000 pieces on tape on a 178mm reel.

SP = 50 pieces on tape in a plastic box.

Contact Bussmann if other package quantities are required.

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

6125T

Time-Lag

Voltage Rating: 125V AC/DC

Interrupting Rating:

50 Amp AC, Power Factor = 1.0

50 Amp DC, Battery Source

Physical Size:

6.1 × 2.5 × 2.5mm (L × W × H)

EIA SOCM-6125AA

Agency Approvals:

Universal Modular Fuse; IEC127-4

UL Recognition, Std. 248-14, File E19180, Guide JDYX2

CSA Certified, C22.2 No. 248.14, File 53787, Class 1422-30

Additional approvals pending.

General Information:

- Surge resistant time-lag fuse.
- Brazed seals: body to end plates.
- Compatible with wave soldering.
- Excellent environmental integrity.
- Economical overcurrent protection.

Time-Current Characteristics:

125% of Rating: 1 hour min. carry.

200%: Open within 2 minutes.

1000%: Open within 0.01 to 0.1 seconds.

Electrical Characteristics

Part Number (xx=Package Code)	Current Rating (Amperes)	Marking	Typ. Resistance @ ≤ 10% Rated Current (Ohms)	Max. Power Dissipation @ 125% of Rated Current (Milliwatts)
XX/6125T-250mA	.25	B.25	4.5	500
XX/6125T-500mA	.5	B0.5	1.0	500
XX/6125T-1A	1	B1A	0.25	500
XX/6125T-1.5A	1.5	B1.5	0.10	500
XX/6125T-2A	2	B2A	0.06	500
XX/6125T-3A	3	B3A	0.04	1000
XX/6125T-4A	4	B4A	0.03	1200
XX/6125T-5A	5	B5A	0.02	1200

General Notes:

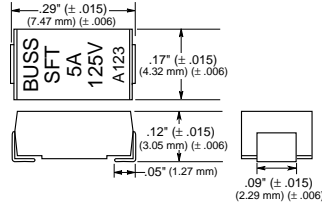
1. Device designed to carry 125% of rated current for one hour minimum. An operating current of 80% or less of rated current is recommended, with further derating required at elevated ambient temperatures.
2. All measurements made at 23 ± 3°C ambient temperature with the device mounted on a suitable circuit board trace.



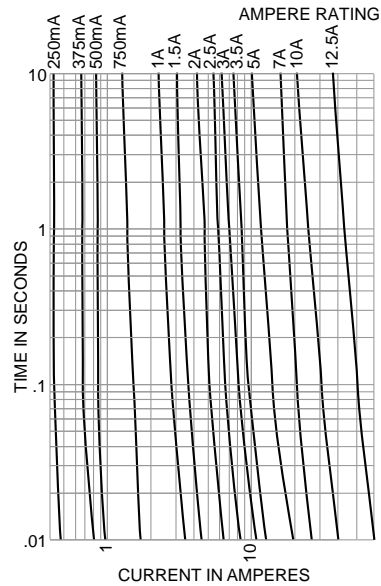
Surface Mount SMD TRON® Fuse



Dimensions - mm (inches)



Time-Current Characteristic Curves—Average Melt (Full Size Curves Available)



SFT

Fast Acting, Current-Limiting

Physical Size: 4.32 × 7.47mm
.170 × .294 in.

Construction: Solid Matrix

General Information:

The Bussmann SMD Tron is designed to EIA-PD-100, DWG SOPM-7243, making it the industry's first, true, surface-mount fuse. A high temperature body material is capable of surviving a 60-second exposure to a temperature of 420°F in a fluorinert FC-5311 environment. Because the SMD Tron is totally sealed, it can be subjected to cleaning by a wide variety of aggressive solvents. These features make the SMD Tron the first subminiature fuse to take full advantage of the production efficiencies offered by surface mount technology.

Packaging & Ordering Information:

	SFT	(See Table)
	Product Symbol	Rated Current

Package Code

TR/ 500 pcs., on a 7" reel, 16mm tape width
TR1/ 2000 pcs., on a 13" reel, 16mm tape width
Weight = .6 lbs/500

Electrical Characteristics

Rated Current ²	Rated Voltage		Interrupting Rating ¹		Pre-arcing I ² t (A ² sec)		Typical Total Clearing ³ I ² t (A ² sec)		Typical Voltage Drop ² Volts at 100% Rated Current	Agency* Approvals	
	AC (Max.)	DC (Max.)	AC	DC	AC	DC	AC	DC		U.R.	CSA
63mA	125V	125V	50A	300A						•	•
125mA	125V	125V	50A	300A						•	•
250mA	125V	125V	50A	300A	7.49 × 10 ⁻⁵	5.1 × 10 ⁻⁶	2.0 × 10 ⁻⁴	6.29 × 10 ⁻⁶	.8	•	•
375mA	125V	125V	50A	300A	3.17 × 10 ⁻⁴	2.18 × 10 ⁻⁵	4.18 × 10 ⁻⁴	2.67 × 10 ⁻⁵	.75	•	•
500mA	125V	125V	50A	300A	4.46 × 10 ⁻⁴	3.8 × 10 ⁻⁵	5.74 × 10 ⁻⁴	4.63 × 10 ⁻⁵	.66	•	•
750mA	125V	125V	50A	300A	1.72 × 10 ⁻³	2.27 × 10 ⁻⁴	2.59 × 10 ⁻³	2.77 × 10 ⁻⁴	.525	•	•
1	125V	125V	50A	300A	.0099	.0069	.0114	.0076	.12	•	•
1.5	125V	125V	50A	300A	.0302	.0204	.0345	.0246	.20	•	•
2	125V	125V	50A	300A	.0784	.0651	.0891	.0811	.170	•	•
2.5	125V	125V	50A	300A	.1775	.1390	.2383	.1574	.145	•	•
3	125V	125V	50A	300A	.3355	.2419	.4359	.2664	.130	•	•
3.5	125V	125V	50A	300A	.4980	.3812	.6355	.4696	.155	•	•
4	125V	125V	50A	300A	.8855	.6785	1.0740	.7829	.135	•	•
5	125V	125V	50A	300A	1.7264	1.2912	2.3779	1.3556	.125	•	•
7A	60V	90V	50A	300A					.114	•	•
10A	60V	90V	50A	300A					.130	•	•
12.5A	48V	50A	50A	300A	15		20		.090	•	•

*Approvals: UL Recognition, Std. 248-14, Guide JDYX2, File E19180; CSA Certification, C22.2 No. 248.14, Class 1422-01, File 53787.

1. Interrupting ratings were measured at 100% power factor on AC, and a time constant less than 1ms on DC.
2. Voltage drop was measured at 25°C ± 3°C ambient temperature at rated current with device mounted on a circuit trace.
3. I²t measured at 50 amp, 125 VAC, .95PF, random closing angle; 300 amps, 125 VDC, TC<1ms.
4. Electrical characteristics for 12.5 amp to be determined.
5. Device designed to carry 125% of rated current for one hour minimum. An operating current of 80% or less of rated current is recommended, with further derating required at elevated ambient temperatures.

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



Surface Mount Circuit Protector



3216CP

Fast Acting

Voltage Rating: 24 VDC

Interrupting Rating: 35 Amp DC, Battery Source

Interruption Time:

10 Sec. max @ 250% rated current

1m Sec. Typ. @ 600% rated current

Physical Size:

EIA SOCM-3216 AC equivalent to 1206

3.2 × 1.6 × 0.90mm

0.126 × 0.0634 × 0.035 in.

Agency Approvals:

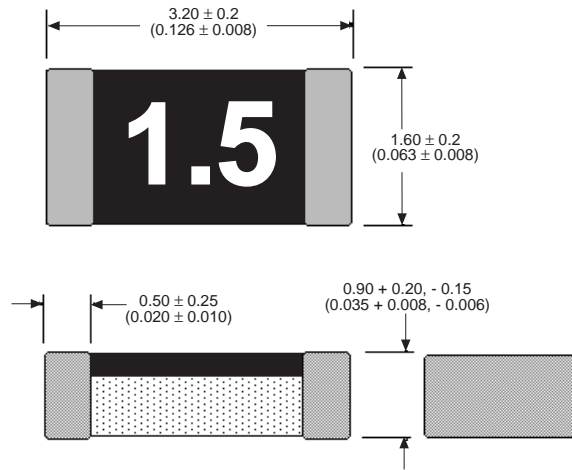
UL Recognition, Std. 248-14, File E19180, Guide JDYX2

CSA Component Acceptance, File 53787, Class 1422-30

General Information:

- Rapid interruption of excessive current.
- Compatible with reflow and wave solder.
- Rugged ceramic and glass construction.
- Excellent environmental integrity.
- One time positive disconnect.

Dimensions - mm (inches)



Packaging and Ordering Information:

Tape and Reel: Standard 8mm tape, in compliance with EIA-RS481 (equivalent to IEC 286, Part 3).

	3216CP	(See Table)
	Product Symbol	Rated Current

Package Code

TR = 3,000 pieces on tape on a 178mm reel.

TR1 = 15,000 pieces on tape on a 330mm reel.

SP = 50 pieces on tape in a plastic box.

Contact Bussmann if other package quantities are required.

Electrical Characteristics

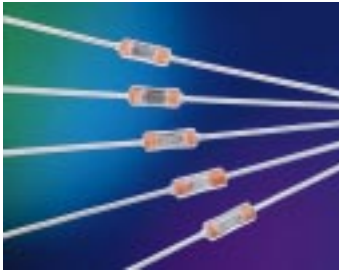
Part Number (XX= Package Code)	Current Rating (Amperes)	Typ. Resistance @ ≤ 10% Rated Current (Ohms)	Typical Voltage Drop @ Rated Current (Volts)
XX/3216CP-250mA	.250	4.50	1.4
XX/3216CP-375mA	.375	1.80	.73
XX/3216CP-500mA	.500	1.15	.66
XX/3216CP-750mA	.750	.75	.63
XX/3216CP-1A	1	.168	.20
XX/3216CP-1.5A	1.5	.098	.18
XX/3216CP-2A	2	.063	.16
XX/3216CP-2.5A	2.5	.046	.14
XX/3216CP-3A	3	.037	.13
XX/3216CP-4A	4	.019	.11
XX/3216CP-4.5A	4.5	.014	.10
XX/3216CP-5A	5	.013	.09

General Notes:

1. Device designed to carry rated current for four hours minimum. An operating current of 80% or less of rated current is recommended, with further derating required at elevated ambient temperatures.
2. All measurements made at 23 ± 3°C ambient temperature with the device mounted on a suitable circuit board trace.
3. It is recommended that circuit protectors be mounted with glass side facing up.
4. It is recommended that fuses be mounted with ceramic (white) side facing up.
5. Contact Bussmann if higher ampere ratings are needed.



Subminiature Axial Lead Circuit Protector



DO-35

Voltage Rating: 32V AC/DC

Interrupting Rating: 50 Amp AC, Power Factor = 1.0
50 Amp DC, Battery Source

Physical Size:

EIA/JEDEC Publication 95

Outline DO-35

Axial Leads

Agency Approvals:

UL Recognized, Std. 248-14, File E19180, Guide JDYX2

CSA Component Acceptance, File 53787, Class 1422-30

General Information:

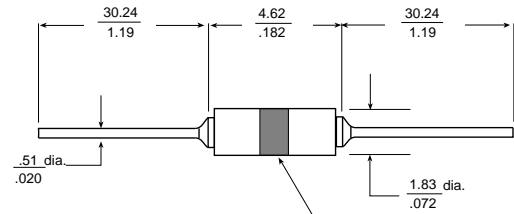
- Economical overcurrent protection.
- Compatible with wave soldering.
- Unaffected by rigorous board washing operations.
- Excellent environmental integrity.
- One time positive disconnect.

Interruption Time:

10 Sec. max. @ 250% rated current

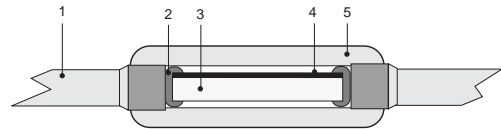
1 mSec. typ. @ 500% rated current

Dimensions - $\frac{\text{mm } (\pm 0.13)}{\text{inches } (\pm 0.005)}$



Color band(s) to identify ampere rating.
(see chart below).

Construction



1. Lead assembly, tin-lead dipped.
2. End termination.
3. Ceramic substrate.
4. Metal film fuse element.
5. Glass tube.

Packaging and Ordering Information:

Tape and Reel: In compliance with EIA-296-E or EIA-468-A.

	DO-35	(See Table)
	Product Symbol	Rated Current
Package Code		
Blank	= 10 pieces, bulk packed	
BK	= 500 pieces, bulk packed	
TR	= 2,500 pieces, tape/reel, 52.4mm tape to tape spacing per EIA-296-E	
TR1	= 5,000 pieces, tape/reel, 52.4mm tape to tape spacing per EIA-296-E	
TR2	= 2,500 pieces tape/reel, radial configuration, 5.08mm lead to lead spacing per EIA-468-A.	
Contact Bussmann if other package quantities are required.		

Electrical Characteristics

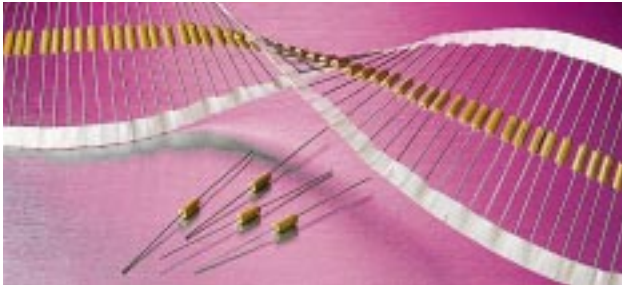
Part Number (xx = Package Code)	Current Rating (Amperes)	Color Code Color	# of Bands	Typ. Resistance @ $\leq 10\%$ Rated Current (Ohms)	Typical Voltage Drop @ Rated Current (Volts)
xx/DO-35-250mA	.25	Green	1	4.5	1.4
xx/DO-35-375mA	.375	Green	2	3.0	1.35
xx/DO-35-400mA	.400	NA	0	3.0	1.2
xx/DO-35-500mA	.5	Blue	1	1.4	0.84
xx/DO-35-750mA	.75	Blue	2	0.55	0.50
xx/DO-35-1A	1	Brown	1	0.32	0.39
xx/DO-35-1.5A	1.5	Brown	2	0.15	0.27
xx/DO-35-2A	2	Black	1	0.10	0.26
xx/DO-35-2.5A	2.5	Black	2	0.072	0.23
xx/DO-35-3A	3	Yellow	1	0.05	0.20
xx/DO-35-3.5A	3.5	Yellow	2	0.04	0.19

General Notes:

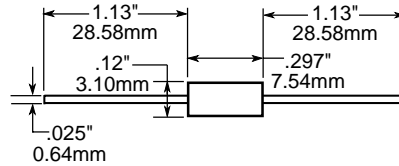
1. Device designed to carry rated current for four hours minimum. An operating current of 80% or less of rated current is recommended, with further derating required at elevated ambient temperatures.
2. All measurements made at $23 \pm 3^\circ\text{C}$ ambient temperature with the device mounted on a suitable circuit board trace.



Subminiature Microtron® Axial Lead Fuse



Dimensions - mm (inches) All tolerances: $\pm 0.005''$
 $\pm 0.13\text{mm}$



MCR

Fast Acting, Current Limiting

Physical Size:

3.10 x 7.54mm
0.122 x 0.297 in.

Construction: Solid Matrix

General Information:

The MICROTRON® subminiature fuse is designed to safely interrupt 50 amperes at 125 VAC. This excellent performance is achieved at power factors as low as 97%. Competitive components claim similar short-circuit interrupting ratings, but at a 100% power factor—a condition that rarely exists in real world applications. In addition, the MICROTRON is capable of interrupting a 300 ampere fault at 125 VDC.

Packaging and Ordering Information:

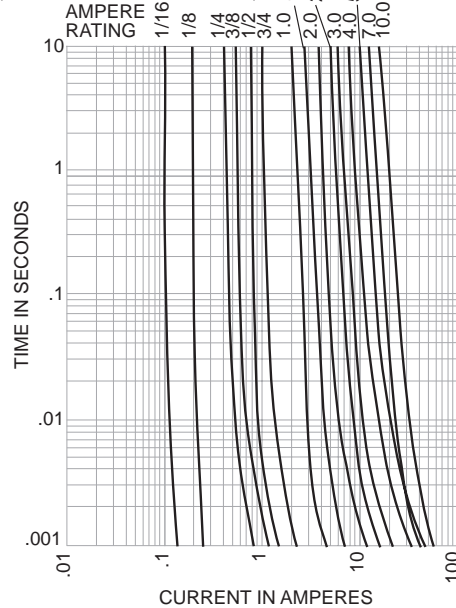
	MCR	(See Table)
	Product Symbol	Rated Current

Package Code

- Blank** 10 in
 - BK** 500 in
 - TR/** Tape/Reel 2500 units, 52.4mm spacing
 - TR1/** Tape/Reel 5000 units, 52.4mm spacing
 - TR6/** Tape/Reel 1000 units, 52.4mm spacing
- Radial leaded versions available (.4", .6" spacing)

Time Current Characteristic Curves - Average Melt

(Full Size Curves Available)



CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Current Rating	Rated Voltage		Interrupting Rating ¹		Pre-arcing ² I ² T (A ² sec)		Typical Total Clearing ² I ² T (A ² sec)		Typical Voltage Drop Volts at 100% Rated Current	Agency* Approvals		
	AC (Max.)	DC (Max.)	AC	DC	AC	DC	AC	DC		UR	CSA	JIS
1/16	125V	125V	50A	300A	1.1 x 10 ⁻⁶	1.0 x 10 ⁻⁷	1.8 x 10 ⁻⁶	1.5 x 10 ⁻⁷	2.33	•	•	
	125V	125V	50A	300A	4.3 x 10 ⁻⁶	7.1 x 10 ⁻⁷	7.3 x 10 ⁻⁶	8.7 x 10 ⁻⁷	1.52	•	•	
	125V	125V	50A	300A	8.0 x 10 ⁻⁵	1.0 x 10 ⁻⁶	1.2 x 10 ⁻⁴	1.3 x 10 ⁻⁶	.76	•	•	
1/8	125V	125V	50A	300A	9.7 x 10 ⁻⁵	6.7 x 10 ⁻⁶	1.1 x 10 ⁻⁴	8.3 x 10 ⁻⁶	.73	•	•	
	125V	125V	50A	300A	7.4 x 10 ⁻⁴	5.4 x 10 ⁻⁵	6.2 x 10 ⁻³	6.8 x 10 ⁻⁵	.65	•	•	
	125V	125V	50A	300A	1.3 x 10 ⁻³	7.4 x 10 ⁻⁵	7.5 x 10 ⁻²	9.2 x 10 ⁻⁵	.55	•	•	
1/4	125V	125V	50A	300A	.01	.01	.02	.01	.24	•	•	•
	125V	125V	50A	300A	.03	.02	.04	.03	.20	•	•	•
	125V	125V	50A	300A	.09	.07	.11	.08	.16	•	•	•
3/8	125V	125V	50A	300A	.19	.14	.25	.17	.15	•	•	•
	125V	125V	50A	300A	.35	.28	.45	.32	.15	•	•	•
	125V	125V	50A	300A	.56	.37	.83	.43	.14	•	•	•
1/2	125V	125V	50A	300A	.96	.67	1.37	.77	.13	•	•	•
	125V	125V	50A	300A	1.82	1.34	2.53	1.51	.11	•	•	•
	60V	90V	50A	300A	1.48	.49	2.02	.58	.10	•	•	•
10	60V	90V	50A	300A	3.62	1.16	4.41	1.38	.08	•	•	

*Approvals: UL Recognition, Std. 248-14, Guide JDYX2, File E19180; CSA Certification, Class 1422-01, File 53787.

JIS (Japanese Industrial Standard) Reg. No. 2221, Authorization No. 32-1516.

1. Interrupting ratings were measured at 100% (1/16 to 5) and 100% (7, 10) power factors on AC, and a time constant less than 1ms. on DC.

2. I²t was measured at 50 amps 125 VAC, .95PF, (random closing angle) and 300 amps 125 VDC, TC < 1ms. for 1/16 through 5 amps and 50 amps 60 VAC, .95 PF (random closing angle), and 300 amps 90 VDC, TC < 1ms. for the 7 and 10 amp fuses.

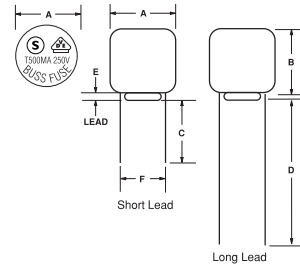
Note: All values shown above are typical.



Subminiature Radial Lead Micro Fuse



Dimensions - mm



Dimensions are in mm (± 0.13).

	Short Lead	Long Lead
A	8.35	8.35
B	7.7	7.7
C	4.3	—
D	—	18.8
E	0.5	0.5
F	5.0	5.0

ETF

Radial Lead Micro Fuse

Voltage Rating: 250 VAC

Ampere Rating: 80mA to 6.3A

Agency Approvals:

SEMKO and VDE approved except 5A and 6.3A which are not included in the standard. All are UL recognized and CSA certified.

General Information:

- Time-lag, radial leaded micro fuses in accordance with the specifications of IEC 127-3, standard sheet 4 (Type T).

Electrical Characteristics

Catalog Number*	Rating	Typical mV Drop Measured at 75% Normal Ambient	Melting I ^t A ² Sec.
ETF-80mA	80mA	400	0.0061
ETF-100mA	100mA	350	0.011
ETF-125mA	125mA	300	0.020
ETF-160mA	160mA	280	0.059
ETF-200mA	200mA	260	0.054
ETF-250mA	250mA	240	0.15
ETF-315mA	315mA	220	0.27
ETF-400mA	400mA	200	0.61
ETF-500mA	500mA	190	0.95
ETF-630mA	630mA	180	1.22
ETF-800mA	800mA	160	2.15
ETF-1	1A	140	3.65
ETF-1.25	1.25A	130	6.76
ETF-1.6	1.6A	120	10.12
ETF-2	2A	100	17.4
ETF-2.5	2.5A	100	22.1
ETF-3.15	3.15A	100	31.0
ETF-4	4A	100	53.8
ETF-5	5A	Contact factory for availability	
ETF-6.3	6.3A		

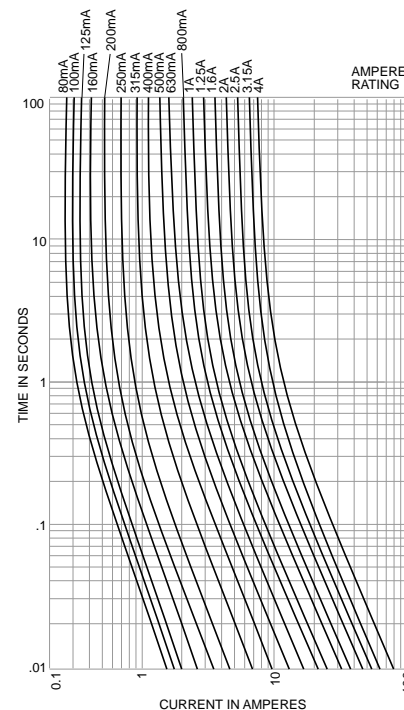
* Please add the following prefixes to the catalog number to denote packaging required:

- AP/ - Ammo-pack taped 1000 per box or,
- BK/ - In bulk 100 per bag (short lead only).

For example: AP/ETF-800mA for Ammo-pack and BK/ETF-800mA for Bulk Pack.

Weight: 573 grams per 1000.

Time Current Characteristic Curves - Total Clear



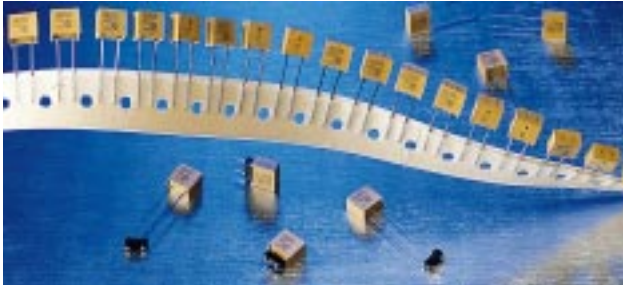
Rated Current	150%		210%		275%		400%		1000%	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
80mA to 6.3A	1 hr.	2 min.	400 ms.	10 sec.	150 ms.	3 sec.	20 ms.	150 ms.		

All are 250 VAC

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



Subminiature PC-Tron® Radial Lead Fuse



PCB, PCC, PCF, PCH, PCD, PCE, PCG, PCI

Fast Acting

Physical Size and Construction:

Body: 0.350" x 0.350" x 0.184"; High temperature plastic.
 Leads: 0.020" x 0.015" x 0.100" (short) 0.750" (full); (tape & reel) Tin-plated copper.

Agency Approvals:

PCB, PCC, PCD, PDE, PCF, PCG, PCH, and PCI — UL Recognized; File E19180, Guide JDYX2.

PCB, PCC, PCD, PCF, PCG, PCH, PCI, and PDE — CSA Certified; File 42731, Class 1421-01

General Information:

The PC-TRON® subminiature fuse offers short-circuit performance. At 250 VAC, the ½ to 3 amp PC-Tron can safely interrupt 50 amperes; at 125 VAC, the ½ to 5 amp versions can interrupt 10,000 amperes. This high interrupting capacity makes the PC-Tron subminiature fuse ideal for line-side protection of power supplies.

Packaging & Ordering Information:

Standard Fuse

	PC		BK/	PCS
Packaging Code	Catalog Symbol	Ampere Rating	Packaging Code	Catalog Symbol
Blank—Std. Pack (5-in)	B - Full lead lgth. (250V) (½-3A)	(½, ¾, 1, 1½, 2, 2½, 3, and 5)	Bulk Pack (100-in)	
BK/ Bulk (100-in)	C - Short lead lgth.* (250V) (½-3A)	(5A available only as PCD, PCE, PCG)		
TR/ Tape & Reel (500-in)	D - Full lead lgth. (125V) (5A)			
	E - Short lead lgth.* (125V) (5A)			
	F - 0.4" Lead spacing (½-3A)			
	G - 0.4" Lead spacing (5A)			
	H - ½-3A			
	I - 5A			

*Note—Short lead length not available in tape-and-reel packaging.

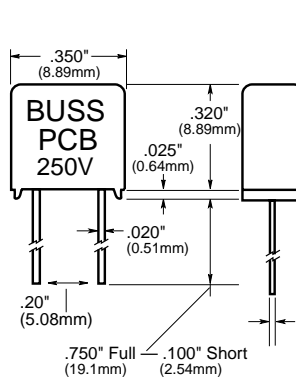
Electrical Characteristics

Catalog Symbol	Current Rating	VAC	AC Interrupting	VDC	DC Interrupting
PCB, PCC, PCF & PCH	0.5 - 2.5	250	50A at 250V 10kA at 125V	450	300 - 5900A
PCB, PCC, PCF & PCH	2.6 - 3.0	250	50A at 250V 10kA at 125V	350	300 - 4400A
PCD, PCE, PCG & PCI	5.0	125	10kA at 125V	250	300 - 4200A

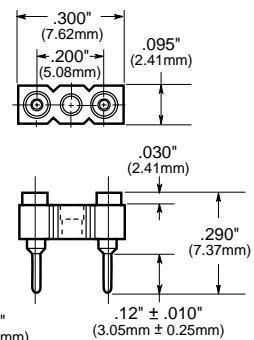
Dimensions - mm (inches)

All tolerances: ±.005"
±.13mm

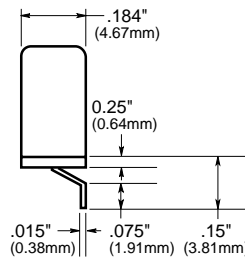
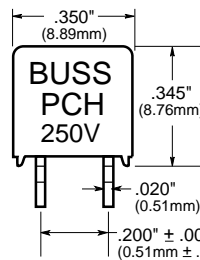
Standard Fuse (PCB, PCD)



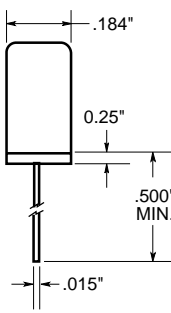
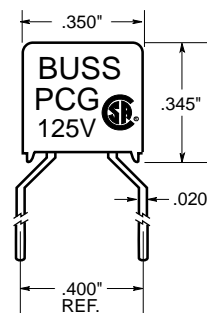
Socket (PCS)



Surface Mount Fuse (PCH, PCI)



Fuse with 0.4" Lead Spacing (PCF, PCG)



Time-Current Characteristics:

Carry 100% of rating for 4 hrs. minimum. Open at 200% of rating in 10 sec. maximum. (Non-Time-Delay. . .extremely low let-through)

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



5mm × 15mm Fuse (2 AG)



C515 (Axial Leads) C519

Time-Delay

Physical Size:

0.197" × 0.591"
(5mm × 15mm)

Construction: Glass Tube

Agency Approvals:

UL Listing File E75865, Guide JDYX
125mA-250mA and 375mA-3A
CSA Certification File LR65063,
Class 1422-01, 125mA-250mA and
375mA-3A
UL Recognized, File E75865,
Guide JDYX2, 350mA and 3.5A-7A

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Current Rating	Rated Voltage	Interrupting Rating
125mA	250 VAC	35A/250 VAC 10kA/125 VAC p.f. = 0.7 - 0.8
250mA		
350mA		35A/250 VAC 10kA/125 VAC 25A/600 VAC p.f. = 1
375mA		35A/250 VAC 10kA/125 VAC p.f. = 0.7 - 0.8
500mA		
600mA		
750mA		
1A		
1.25A		
1.5A		100A/250 VAC 10kA/125 VAC p.f. = 0.7 - 0.8
1.6A		
2A		
2.25A		
2.5A		
3A		
3.5A		
4A	125 VAC	400A/125 VAC p.f. = 1.0
5A		
7A		



C518 (Axial Leads) C520

Fast-Acting

Physical Size:

0.197" × 0.591"
(5mm × 15mm)

Construction: Glass Tube

Agency Approvals:

UL Listing File E75865, Guide JDYX
CSA Certification File LR65063,
Class 1422-01

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Current Rating	Rated Voltage	Interrupting Rating	
100mA	250 VAC	35A/250 VAC 10kA/125 VAC p.f. = 0.7 - 0.8	
125mA			
250mA			
375mA			
500mA			
750mA			
1.5A			100A/250 VAC 10kA/125 VAC p.f. = 0.7 - 0.8
2A			
2.5A			
3A			
3.5A			
4A	200A/250 VAC 10kA/125 VAC p.f. = 0.7 - 0.8		
5A			



C517 (Axial Leads) Fast-Acting, Light Ballast Protection

Physical Size:

0.197" × 0.591"
(5mm × 15mm)

Construction: Ceramic

Agency Approvals:

UL Listing File E75865, Guide JDYX
CSA Certification File LR65063,
Class 1422-01
UL Recognized, File E75865,
Guide JDYX2

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Current Rating	Max. Rated Voltage	Interrupting Rating
3A	350 VAC	100A/350 VAC p.f. = 1.0
		100A/250 VAC p.f. = 0.7 - 0.8
		10kA/125 VAC
		p.f. = 0.7 - 0.8



5mm x 20mm Fuse — IEC Standards



GDA (S501) GDA-V (Axial Leads)

**Fast-Acting,
High Breaking Capacity**

Physical Size:

0.197" x 0.788" (5mm x 20mm)

Construction: Ceramic Tube

End caps: Nickel or silver-plated brass

Voltage Rating: 250 VAC or less

Interrupting Rating: 1500A @ 250 VAC

Agency Approvals: Designed to IEC 127-2-1 British

Standard Approval; UL Recognized, Guide JDYX2,

File E75865, 50mA and 315mA-6.3A; SEMKO Approval
50mA, 200mA and 315mA-6.3A



GDB (S500) GDB-V (Axial Leads)

**Fast-Acting,
Low Breaking Capacity**

Physical Size:

0.197" x 0.788" (5mm x 20mm)

Construction: Glass Tube

End caps: Nickel or silver-plated brass

Voltage Rating: 250 VAC or less

Interrupting Rating: 35A @ 250 VAC or 10 x rated current.

Agency Approvals: Designed to IEC 127-2-2 British

Standard Approval; SEMKO Approval; VDE Approval, IMQ;

UL Recognized, Guide JDYX2, File E75865, 32mA-6.3A

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Current Rating	I^2t	Max Voltage Drop (mV)
32mA	0.00003	3200
40mA	0.00007	2800
50mA	0.00014	2400
63mA	0.00028	2000
80mA	0.0014	1200
100mA	0.0030	1100
125mA	0.0063	1000
160mA	0.008	2000
200mA	0.016	1700
250mA	0.036	1400
315mA	0.068	1300
400mA	0.18	1000
500mA	0.18	220
630mA	0.35	220
800mA	0.67	190
1A	0.60	200
1.25A	0.84	200
1.6A	1.6	190
2A	4.2	150
2.5A	6.1	150
3.15A	13	130
4A	22	130
5A	42	120
6.3A	69	120
8A***	100	140
10A***	160	140

*IEC Standard 127, Sheet I does not include ratings above 6.3A.

**Product is available only as S501 series.

Electrical Characteristics

Current Rating	I^2t	Max Voltage Drop (mV)
50mA	0.0017	9500
63mA	0.0004	3200
80mA	0.0007	2800
100mA	0.0015	2400
125mA	0.0037	1900
160mA	0.008	1600
200mA	0.016	1500
250mA	0.029	1400
315mA	0.010	1500
400mA	0.018	1300
500mA	0.018	360
630mA	0.037	340
800mA	0.068	300
1A	0.047	240
1.25A	0.085	230
1.6A	1.9	190
2A	2.0	220
2.5A	3.9	200
3.15A	6.9	170
4A	14	160
5A	25	140
6.3A	48	130
8A*	104	130
10A	158	130
12A*	—	—
16A*	—	—

*IEC Standard 127, Sheet II does not include ratings above 6.3A.

BIF document: 2014

BIF document: 2015



5mm × 20mm Fuse — IEC Standards



GDC (S504/S506) GDC-V (Axial Leads)

Time Delay, Low Breaking Capacity
Physical Size:

0.197" × 0.788" (5mm × 20mm)

Construction: Glass Tube

End caps: Nickel or silver-plated brass

Voltage Rating: 250 VAC or less

Interrupting Rating: 35A @ 250 VAC or 10 × rated current.

Agency Approvals:

Designed to IEC 127-2-3

British Standard Approval

SEMKO Approval

VDE Approval, IMQ

UL Recognized, Guide JDYX2, File E75865, 32mA-6.3A

Electrical Characteristics

Current Rating	I ² t (A ² sec)	Max Voltage Drop (mV)
32mA	0.0014	1100
40mA	0.0034	1000
50mA	0.006	800
63mA	0.012	800
80mA	0.015	610
100mA	0.022	520
125mA	0.034	420
160mA	0.052	340
200mA	0.078	360
250mA	0.17	290
315mA	0.41	270
400mA	0.61	230
500mA	0.75	180
630mA	1.3	170
800mA	3.1	140
1A	3.6	90
1.25A	7	80
1.6A	10	80
2A	17	80
2.5A	34	75
3.15A	56	75
4A	91	75
5A	133	65
6.3A	270	65
8A**,**	284	75
10A**,**	506	60
12.5A**,**	852	60

*IEC Standard 127, Sheet III does not include ratings above 6.3A.

**Product is available only as S506 series.



S505 S505-V

**Time-Delay
High Breaking Capacity
Physical Size:**

0.197" × 0.788" (5mm × 20mm)

Construction: Ceramic

End caps: Nickel-plated brass

Voltage Rating: 250 VAC or less

Interrupting Rating: 1500A at 250 VAC

Agency Approvals: Designed to IEC 127-2-5

UL Recognized, Guide JDYX2, File E75865, SEMKO, IMQ

Electrical Characteristics

Current Rating	I ² t (A ² sec)	Max Voltage Drop (mV)
500mA	0.17	360
800mA	0.70	280
1A	0.74	170
1.25A	1.5	150
1.6A	3.5	130
2A	7.6	110
2.5A	14	100
3.15A	27	90
4A	52	85
5A	98	80
6.3A	197	75
8A	311	75
10A	397	72

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



5mm × 20mm Fuse — N. American Standards



GMA GMA-V (Axial Leads)

Fast Acting

Physical Size:

0.197" × 0.788"

(5mm × 20mm)

Construction: Glass Tube

End caps: Nickel or silver-plated brass

Agency Approvals: cc

Designed to UL 198G and

CSA 22.2 N59

UL Listed, Std. 248-14, Guide JDYX,

File E75865, 0-6A

UL Recognized, Guide JDYX2,

File E75865, 7-15A

CSA Certified, C22.2 No. 248.14,

Class 1422-01, File 65063, 0-6A

Electrical Characteristics

Current Rating	Rated Voltage	Breaking Capacity
63mA 100mA 125mA 200mA 250mA 300mA 315mA 500mA 600mA 750mA 800mA	250 VAC	35A/250 VAC 10kA/125 VAC p.f. = 0.7 – 0.8
1A 1.2A 1.25A 1.5A 1.6A 2A 2.5A 3A 3.15A 3.5A 4A 5A 6A 7A 8A 10A 15A		100A/250 VAC 10kA/125 VAC p.f. = 0.7 – 0.8
	125 VAC	10kA/125 VAC p.f. = 0.7 – 0.8
		200A/125 VAC p.f. = 1.0
		150A/125 VAC p.f. = 1.0

BIF document: 2017



GMC GMC-V (Axial Leads)

Medium Time-Delay

Physical Size:

0.197" × 0.788"

(5mm × 20mm)

Construction: Glass Tube

End caps: Nickel or silver-plated brass

Agency Approvals: cc

Designed to UL 198G and

CSA 22.2 N59

UL Listed, Std. 248-14, Guide JDYX,

File E75865, 0-6.3A

UL Recognized, Guide JDYX2,

File E75865, 7-10A

CSA Certified, C22.2 No. 248.14,

Class 1422-01, File 65063, 0-6.3A

Electrical Characteristics

Current Rating	Rated Voltage	Breaking Capacity
50mA 63mA 80mA 100mA 125mA 150mA 160mA 200mA 250mA 300mA 315mA 400mA 500mA 600mA 630mA 700mA 750mA 800mA	250 VAC	35A/250 VAC 10kA/125 VAC p.f. = 0.7 – 0.8
1A 1.25A 1.5A 1.6A 2A 2.5A 3A 3.15A 3.5A 4A 5A 6A 6.3A 7A 8A 10A		100A/250 VAC 10kA/125 VAC p.f. = 0.7 – 0.8
	125 VAC	10kA/125 VAC p.f. = 0.7 – 0.8
		200A/125 VAC p.f. = 1.0

BIF document: 2018



GMD GMD-V (Axial Leads)

Time-Delay

Physical Size:

0.197" × 0.788"

(5mm × 20mm)

Construction: Glass Tube

End caps: Nickel or silver-plated brass

Agency Approvals: cc

Designed to UL 198G and

CSA 22.2 N59

UL Listed, Guide JDYX, File E75865,

0-3A

UL Recognized, Std. 248-14,

Guide JDYX2, File E75865, 4A

CSA Certified, C22.2 No. 248.14,

Class 1422-01, File 65063, 0-3A

Electrical Characteristics

Current Rating	Rated Voltage	Breaking Capacity
125mA 150mA 160mA 187mA 200mA 250mA 300mA 315mA 375mA 400mA 500mA 600mA 630mA 750mA 800mA	250 VAC	35A/250 VAC 10kA/125 VAC p.f. = 0.7 – 0.8
1A 1.2A 1.25A 1.5A 1.6A 2A 2.5A 3A 4A		100A/250 VAC 10kA/125 VAC p.f. = 0.7 – 0.8
		200A/250 VAC 10kA/125 VAC, p.f. = 1

BIF document: 2019



1/4" x 5/8" and 1/4" x 1" Fuses



AGA AGA-V (Axial Leads)

Fast Acting

Physical Size:

1/4" x 5/8" (1AG)
(6.4mm x 15.9mm)

Construction: Glass Tube

Voltage Rating: See table below.

Agency Approvals: Std. 248-14

UL File E19180,

UL Listed, Guide JDYX, 0-2 1/2A

UL Recognized, Guide JDYX2, 3-30A

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Catalog Symbol & Current Ratings

125 VAC

AGA-1/16	AGA-1/2	AGA-2
AGA-1/10	AGA-9/10	AGA-2 1/2
AGA-1/8	AGA-3/4	AGA-3
AGA-1/4	AGA-1	AGA-5
AGA-3/8	AGA-1 1/2	—

32 VAC

AGA-6	AGA-10	AGA-25
AGA-7	AGA-15	AGA-30
AGA-7 1/2	AGA-20	—

BIF document: 2039



AGW

Fast Acting

Physical Size:

1/4" x 7/8" (7AG)
(6.4mm x 22.2mm)

Construction: Glass Tube

Voltage Rating: 32V

Catalog Symbol & Current Ratings

32 VAC

AGW-1	AGW-4	AGW-15
AGW-1 1/2	AGW-5	AGW-20
AGW-2	AGW-6	AGW-25
AGW-2 1/2	AGW-7 1/2	AGW-30
AGW-3	AGW-10	—

BIF document: 2040



AGX AGX-V (Axial Leads)

Fast Acting

Physical Size:

1/4" x 1" (8AG)
(6.4mm x 25.4mm)

Construction: Glass Tube

Voltage Rating: See table below.

Agency Approvals: Std. 248-14

UL File E19180

UL Listed, Guide JDYX, 0-5A

UL Recognized, Guide JDYX2, 6-30A

CSA File 47233; Class 1422-01, 0-5A

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Catalog Symbol & Current Ratings

250 VAC

AGX-1/500	AGX-3/16	AGX-3/4
AGX-1/200	AGX-1/10	AGX-1
AGX-1/100	AGX-1/4	AGX-1 1/4
AGX-1/32	AGX-3/10	AGX-1 1/2
AGX-1/16	AGX-3/8	AGX-2
AGX-1/10	AGX-1/10	—
AGX-1/8	AGX-1/2	—

125 VAC

AGX-2 1/2	AGX-4	—
AGX-3	AGX-5	—

32 VAC

AGX-6	AGX-10	AGX-25
AGX-7	AGX-15	AGX-30
AGX-8	AGX-20	—

BIF document: 2041



TDC180

Fast/Medium

Physical Size:

1/4" x 1", (6.4mm x 25.4mm) (8AG)

Construction: Ceramic Tube

End Caps; Silver-plated copper

CE

Agency Approvals:

BS1362, IEC 269-3A

Catalog Symbol & Current Ratings

240 VAC

TDC1801A	TDC180-5A	TDC180-13A
TDC180-2A	TDC180-7A	—
TDC180-3A	TDC180-10A	—



1/4" x 1 1/4" Fuses



TDC10

Fast Acting

Physical Size:

1/4" x 1 1/4"

(6.3mm x 32mm)

Construction: Glass Tube

Voltage Rating: See Below

Agency Approvals:

British Standard BS-2950A

Interrupting Rating: 10/m @ Vm

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Catalog Symbol & Current Ratings

1000 VAC	250 VAC
TDC10-50mA	TDC10-1.5A
TDC10-60mA	TDC10-2A
TDC10-100mA	TDC10-3A
TDC10-150mA	TDC10-5A
TDC10-250mA	150 VAC
750 VAC	TDC10-7A
TDC10-500mA	100 VAC
500 VAC	TDC10-10A
TDC10-750mA	32 VAC
350 VAC	TDC10-12A
TDC10-1A	TDC10-15A
—	TDC10-20A
—	TDC10-25A



AGC

AGC-V (Axial Leads)

Fast Acting

Physical Size:

1/4" x 1 1/4" (3AG)

(6.3mm x 32mm)

Construction: Glass Tube

Voltage Rating: See Below

Interrupting Rating: See Below

Agency Approvals: CE

UL Listed, Std. 248-14,

Guide JDYX, File E19180, 0-10A

UL Recognized, Guide JDYX2,

File E19180, 15-30A

CSA Certified, C22.2 No. 248.14,

Class 1422-01, File 53787

Electrical Characteristics

Current Rating	Rated Voltage		Interrupting Rating ¹	
	AC (Max.)	DC (Max.) ²	AC	DC ²
1/20	250V	250V	35A	35A
1/16	250V	250V	35A	35A
1/10	250V	250V	35A	35A
1/8	250V	250V	35A	35A
3/16	250V	250V	35A	35A
1/4	250V	250V	35A	35A
3/10	250V	250V	35A	35A
3/8	250V	250V	35A	35A
4 ³ /100	250V	250V	35A	35A
1/2	250V	250V	35A	35A
3/4	250V	250V	35A	35A
1	250V	250V	35A	35A
1 1/4	250V	250V	100A	100A
1 1/2	250V	250V	100A	100A
2	250V	250V	100A	100A
2 1/4	250V	250V	100A	100A
2 1/2	250V	250V	100A	100A
3	250V	250V	100A	100A
4	250V	250V	200A	200A
5	250V	250V	200A	200A
6	250V	250V	200A	200A
7	250V	250V	200A	200A
8	250V	250V	200A	200A
9	250V	250V	200A	200A
10	250V	250V	200A	200A
15	32V	—	1000A	—
20	32V	—	1000A	—
25	32V	—	1000A	—
30	32V	—	1000A	1000A

¹Interrupting ratings were measured at 70% - 80% power factor on AC, and at a time constant described in UL 198L.

²1-10A, UL Recognized for 125 VDC and 500 AIC. Other DC ratings are self-certified.

BIF document: 2001



ABC

ABC-V (Axial Leads)

Fast Acting

Physical Size:

1/4" x 1 1/4" (3AB)

(6.3mm x 32mm)

Construction: Ceramic Tube

Voltage Rating: See Below

Interrupting Rating: See Below

Agency Approvals: CE

UL Listed, Std. 248-14,

Guide JDYX, File E19180, 0-15A

UL Recognized,

Guide JDYX2, File E19180, 20-25A

CSA Certified, C22.2 No. 248.14,

Class 1422-01, File 53787,

Class 1422-30, File 53787, 20-25A

Electrical Characteristics

Current Rating	Rated Voltage		Interrupting Rating ¹	
	AC (Max.)	DC (Max.) ²	AC	DC ²
1/4	250V	250V	35A	35A
1/2	250V	250V	35A	35A
3/4	250V	250V	35A	35A
1	250V	250V	35A	35A
1 1/2	250V	—	100A	—
2	250V	—	100A	—
2 1/2	250V	—	100A	—
3	250V	—	100A	—
4	250V	250V	200A	200A
5	250V	250V	200A	200A
6	250V	—	200A	—
7	250V	—	200A	—
8	250V	—	200A	—
10	250V	250V	200A	200A
15	250V	250V	750A	750A
20	250V	—	400A	—
25	125V	—	1000A	—
30	125V	—	1000A	—

¹Interrupting ratings were measured at 70% - 80% power factor on AC, and at a time constant described in UL 198L.

²DC ratings are self-certified.

BIF document: 2000



1/4" x 1 1/4" Fuses



GBB
GBB-V (Axial Leads)

Very Fast Acting

Physical Size:

1/4" x 1 1/4"
(6.3mm x 32mm)

Construction: Ceramic Cartridge

Voltage Rating: 250 VAC/125 VDC

Agency Approvals:

UL Recognized, Std. 248-14, 1-30,
125 VDC/250 VAC

File E56412, Guide JFHR2

CSA Certified, C22.2 No. 248.14, 1-10,
125 VDC/250 VAC

File 53787, Class 1422-01

Catalog Symbol and Current Ratings

GBB-1	GBB-6	GBB-15
GBB-1 1/4	GBB-7	GBB-20
GBB-2	GBB-8	GBB-25
GBB-3	GBB-9	GBB-30
GBB-4	GBB-10	—
GBB-5	GBB-12	—

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



TDC11

Time Lag

Physical Size:

1/4" x 1 1/4"
(6.3mm x 32mm)

Construction: Glass Tube

Voltage Rating: See Below

Interrupting Rating: 10 times rated current

Catalog Symbol and Current Ratings

1000 VAC	250 VAC
TDC11-50mA	TDC11-1.5A
TDC11-60mA	TDC11-2A
TDC11-100mA	TDC11-3A
TDC11-150mA	TDC11-5A
TDC11-250mA	150 VAC
750 VAC	TDC11-7A
TDC11-500mA	100 VAC
500 VAC	TDC11-10A
TDC11-750mA	
350 VAC	
TDC11-1A	

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



FWH

Semiconductor Fuse

Physical Size:

1/4" x 1 1/4"
(6.3mm x 32mm)

Construction: Ceramic Tube

Voltage Rating: 500V AC

Agency Approvals: Std. 248-14

UL Recognized .25-7, 500V AC,
File E91958, Guide JFHR2

UL Recognized 10-30, 500V AC,
File E56412, Guide JFHR2

Catalog Symbol & Current Ratings

FWH-.250A6F	FWH-010A6F
FWH-.500A6F	FWH-12.5A6F
FWH-001A6F	FWH-015A6F
FWH-002A6F	FWH-016A6F
FWH-3.15A6F	FWH-020A6F
FWH-005A6F	FWH-025A6F
FWH-6.30A6F	FWH-030A6F
FWH-007A6F	

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000V AC, 75-1500V DC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

1/4" x 1 1/4" Time-Delay Fuses



MDL MDL-V (Axial Leads)

Time-Delay

Physical Size:

1/4" x 1 1/4"
(6.3mm x 32mm)

Construction: Glass Tube
Plated Brass End Caps

Voltage Rating: See Below

Interrupting Rating: See Below

Agency Approvals:

UL Listed, Std. 248-14, Guide JDYX,
File E19180; 1/16-8A
CSA Certified, C22.2 No. 248.14,
Class 1422-01, File 53787, 1/16-8A
UL Recognized, Guide JDYX2,
File E19180, 8.1-30A

Electrical Characteristics

Current Rating	Rated Voltage		Interrupting Rating ¹	
	AC (Max.)	DC (Max.) ²	AC	DC ²
1/16	250V	250V	35A	35A
1/10	250V	250V	35A	35A
1/8	250V	250V	35A	35A
3/16	250V	250V	35A	35A
1/4	250V	250V	35A	35A
3/10	250V	250V	35A	35A
1/2	250V	250V	35A	35A
3/4	250V	250V	35A	35A
1	250V	250V	35A	35A
1 1/4	250V	250V	100A	100A
1 1/2	250V	250V	100A	100A
2	250V	250V	100A	100A
2 1/4	250V	250V	100A	100A
2 1/2	250V	250V	100A	100A
3	250V	250V	100A	100A
4	250V	32V	200A	1000A
5	250V	32V	200A	1000A
6	250V	32V	200A	1000A
7	250V	32V	200A	1000A
8	250V	250V	200A	200A
9	32V	32V	1000A	1000A
10	32V	32V	1000A	1000A
15	32V	32V	1000A	1000A
20	32V	32V	1000A	1000A
25	32V	32V	1000A	1000A
30	32V	32V	1000A	1000A

¹Interrupting ratings were measured at 70% - 80% power factor on AC, and at a time constant described in UL 198L.

²DC ratings are self-certified.

CE

BIF document: 2004



MDQ

Dual Element Time-Delay

Physical Size:

1/4" x 1 1/4"
(6.3mm x 32mm)

Construction: Glass Tube

Agency Approvals:

UL Listed, Std. 248-14, File E19180;
Guide JDYX, 1/16-7A
CSA Certified, C22.2 No. 248.14, File
47233,
Class 1422-01, 1/16-7A
UL Recognized, Guide JDYX2, File
E19180, 7.1-30A

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Catalog Symbol & Current Ratings

250 VAC			
MDQ-1/100	MDQ-3/8	MDQ-1 9/10	MDQ-7
MDQ-1/62	MDQ-9/10	MDQ-2	32 VAC
MDQ-1/16	MDQ-1/2	MDQ-2 1/4	MDQ-7 1/2
MDQ-1/10	MDQ-9/10	MDQ-2 1/2	MDQ-8
MDQ-1/8	MDQ-3/4	MDQ-2 9/10	MDQ-9
MDQ-15/100	MDQ-9/10	MDQ-3	MDQ-10
MDQ-17 9/1000	MDQ-1	MDQ-3 2/10	MDQ-12
MDQ-3/16	MDQ-1 2/10	MDQ-4	MDQ-15
MDQ-2/10	MDQ-1 1/4	MDQ-5	MDQ-20
MDQ-1/4	MDQ-1 1/2	MDQ-6	MDQ-25
MDQ-3/10	MDQ-1 6/10	MDQ-6 1/4	MDQ-30

BIF document: 2044



MDA

MDA-V (Axial Leads)

Time-Delay

Physical Size:

1/4" x 1 1/4"
(6.3mm x 32mm)

Construction: Ceramic Tube

Agency Approvals:

UL Listed, Std. 248-14, Guide JDYX,
File E19180, 0-15A
CSA Certified, C22.2 No. 248.14, Class
1422-01,
File 53787, 0-15A

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Electrical Characteristics

Current Rating	Rated Voltage		Interrupting Rating ¹	
	AC (Max.)	DC (Max.)	AC	DC
2/10	250V	250V	35A	35A
1/4	250V	250V	35A	35A
1/2	250V	250V	35A	35A
3/4	250V	250V	35A	35A
1	250V	250V	35A	35A
1 1/2	250V	250V	100A	100A
2	250V	250V	100A	100A
2 1/2	250V	250V	100A	100A
3	250V	250V	100A	100A
4	250V	250V	200A	200A
5	250V	250V	200A	200A
6	250V	250V	200A	200A
7	250V	250V	200A	200A
8	250V	250V	200A	200A
10	250V	250V	200A	200A
15	250V	250V	1500A	400A
20	250V	250V	400A	1000A
25	125V	125V	1000A	1000A
30	125V	125V	1000A	1000A

¹Interrupting ratings were measured at 70% - 80% power factor on AC, and at a time constant described in UL 198L.

BIF document: 2002



Subminiature Fuses w/Axial & Radial Leads



GFA

Axial Leads, Fast Acting

Physical Size:

0.145" × 0.300"
(3.7mm × 7.6mm)

Construction: Glass Tube

Interrupting Rating: 50 AIC

Agency Approvals:

UL Recognized, Guide JDYX2,
File E19180, 0-5A
CSA Certified, Class 1422-01,
File 53787, 0-5A

Catalog Symbol & Current Ratings

Amps	Test Spec.	Color Code (Opposite Ends)	
125 VAC			
GFA-1/200	A	Red	Blk
GFA-1/100	A	Red	Orn
GFA-1/64	A	Red	Grn
GFA-1/50	A	Red	Wht
GFA-1/32	A	Red	Brn
GFA-1/20	A	Yel	Yel
GFA-1/16	A	Brn	Brn
GFA-1/10	A	Red	Red
GFA-1/8	A	Orn	Orn
GFA-15/100	B	Red	Yel
GFA-2/10	B	Red	Blu
GFA-1/4	B	Red	Pur
GFA-3/10	A	Grn	Grn
GFA-1/10	A	Blu	Blu
GFA-1/2	B	Orn	Grn
GFA-9/10	B	Orn	Blu
GFA-3/4	B	Orn	Pur
GFA-1	B	Yel	Grn
GFA-1 1/2	B	Yel	Pur
GFA-2	B	Grn	Blu
GFA-2 1/2	B	Grn	Brn
GFA-3	B	Blu	Pur
GFA-4	B	Pur	Brn
GFA-5	B	Brn	Blk
32 VAC			
GFA-7	A	Pur	Grn
GFA-8	A	Grn	Blk
GFA-10	A	Yel	Brn
GFA-12	A	Blk	Blu
GFA-15	A	Blk	Pur



GLN

Radial Leads, Fast Acting

Physical Size:

0.145" × 0.300"
(3.7mm × 7.6mm)

Construction: Glass Tube

Interrupting Rating: 50 AIC

Catalog Symbol & Current Ratings

Amps	Color Code (Opposite Ends)	
125 VAC		
GLN-1/100	Red	Orn
GLN-1/32	Red	Brn
GLN-1/20	Yel	Yel
GLN-1/16	Brn	Brn
GLN-1/10	Red	Red
GLN-3/10	Grn	Grn
GLN-1/10	Blu	Blu
32 VAC		
GLN-7	Pur	Grn
GLN-8	Grn	Blk
GLN-10	Yel	Brn



GLX

Radial Leads, Fast Acting

Physical Size:

0.145" × 0.300"
(3.7mm × 7.6mm)

Construction: Glass Tube

Interrupting Rating: 50 AIC

Catalog Symbol & Current Ratings

Amps	Color Code (Opposite Ends)	
125 VAC		
GLX-1/4	Red	Pur
GLX-1/2	Orn	Grn
GLX-3/4	Orn	Pur
GLX-1	Yel	Grn
GLX-1 1/2	Yel	Pur
GLX-2	Grn	Blu
GLX-3	Blu	Pur
GLX-4	Pur	Brn
GLX-5	Brn	Blk



13/32" x 13/8" and 11/2" Fuses



BBS

Fast Acting

Physical Size:

13/32" x 13/8"

(10.3mm x 34.9mm)

Construction: Fibre Cartridge

Interrupting Rating: 10,000A

Voltage Rating: 600 VAC, 250 VAC, 48 VAC

Agency Approvals:

UL Listed, Std. 248-14, 0-5A/600V,

Guide JDYX, File E19180;

CSA Certified, C22.2 No. 248.14,

0-5A/600V, Class 1422-01,

File 53787

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Catalog Symbol & Current Ratings

600 VAC	250 VAC	48 VAC
BBS-1/10	BBS-6	BBS-12
BBS-2/10	BBS-7	BBS-15
BBS-1/4	BBS-8	BBS-20
BBS-3/10	BBS-10	BBS-25
BBS-1/2	—	BBS-30
BBS-6/10	—	—
BBS-3/4	—	—
BBS-9/10	—	—
BBS-1	—	—
BBS-1 1/2	—	—
BBS-1 1/10	—	—
BBS-1 3/10	—	—
BBS-2	—	—
BBS-3	—	—
BBS-4	—	—
BBS-5	—	—



KTQ

Fast Acting

Physical Size:

13/32" x 13/8"

(10.3mm x 34.9mm)

Construction: Fibre Cartridge

Interrupting Rating: 10,000A

Voltage Rating: 600 VAC

Agency Approvals:

UL Recognized, Std. 248-14, 4-6A,

Guide JDYX2, File E19180

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Catalog Symbol & Current Ratings

600 VAC
KTQ-1
KTQ-1 1/10
KTQ-2
KTQ-3
KTQ-4
KTQ-5
KTQ-6

BIF document: 2045



AGU

Fast Acting

Physical Size:

13/32" x 1 1/2" (5AG)

(10.3mm x 38.1mm)

Construction: Glass Tube

No Agency Listings

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Catalog Symbol & Current Ratings

250 VAC	32 VAC		
AGU-1	AGU-4	AGU-20	AGU-50
AGU-2	AGU-5	AGU-25	AGU-60
AGU-3	AGU-8	AGU-30	—
—	AGU-10	AGU-35	—
—	AGU-15	AGU-40	—

BIF document: 2008

BIF document: 2010



13/32" x 1 1/2" Fuses



BAF

Fast Acting

Physical Size:

13/32" x 1 1/2"
(10.3mm x 38.1mm)

Construction: Fibre Tube

Voltage Rating: 250 VAC (1/10-15A)
125 VAC (20-30A)

Interrupting Rating: 10,000A
at 125 VAC

Agency Approvals:

UL Listed, Std. 248-14, 0-15/250 VAC,
Guide JDYX, File E19180

CSA Certified, C22.2 No. 248.14,
0-15/250 VAC, Class 1422-01,
File 53787

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Catalog Symbol & Current Ratings

250 VAC IR*	250 VAC IR*	250 VAC IR*	125 VAC
BAF-3/10	BAF-1 1/2	BAF-6 1/4	BAF-20 IR
BAF-1/4	BAF-1 3/10 IR	BAF-7 IR	BAF-25 10,000A IR
BAF-1/2 IR	BAF-2 100A IR	BAF-8 200A	BAF-30
BAF-9/10 35A	BAF-2 1/2	BAF-9	—
BAF-9/10	BAF-3	BAF-10	—
BAF-1	BAF-4 IR	BAF-12 750A IR	—
—	BAF-5 200A IR	BAF-15	—
—	BAF-6	—	—

*All have interrupting rating of 10,000A at 125V.
DC ratings: 3-6A, 150 VDC; 6-1/4-15A, 12 VDC; 10 KAIC.



BAN

Fast Acting

Physical Size:

13/32" x 1 1/2"
(10.3mm x 38.1mm)

Construction: Fibre Tube

Voltage Rating: 250 VAC

Interrupting Rating:
35A (0.1A), 100A (1 1/2-3A),
200A (4-8A), 750A (10-15A), 10,000A
(20-30A)

Catalog Symbol & Current Ratings

250 VAC			
BAN-1	BAN-5	BAN-10	BAN-25
BAN-2	BAN-6	BAN-12	BAN-30
BAN-3	BAN-7	BAN-15	—
BAN-4	BAN-8	BAN-20	—



**KTK
KLM**

Fast Acting

Physical Size:

13/32" x 1 1/2"
(10.3mm x 38.1mm)

Construction: Melamine Tube

Voltage Rating:

KTK - 600 VAC or less†
KLM - 500V AC/DC or less
(12-30A are UL Recognized for
600 VDC).

†15-30A rated 300 VDC and 10 KAIC.

Interrupting Rating: 100,000A
RMS SYM. (UL) (10 kA for DC)

Agency Approvals:

KTK-UL Listed, Std. 248-14,
Guide JDYX, File E19180

KLM-UL Recognized, Std. 248-14,
Guide JFHR2, File E56412

CSA Certified, C22.2 No. 248.14,
File 53787, Class 1422-01, HRC-Misc

Catalog Symbol & Current Ratings

600 VAC - UL Listed and CSA			
KTK-1/10	KTK-3/4	KTK-4	KTK-12
KTK-1/8	KTK-1	KTK-5	KTK-15
KTK-3/10	KTK-1 1/4	KTK-6	KTK-20
KTK-1/4	KTK-1 1/2	KTK-7	KTK-25
KTK-3/10	KTK-2	KTK-7 1/2	KTK-30
KTK-9/10	KTK-2 1/2	KTK-8	—
KTK-1/2	KTK-3	KTK-9	—
KTK-9/10	KTK-3 1/2	KTK-10	—
500V AC/DC - UL Recognized and CSA			
KLM-1/10	KLM-1/2	KLM-3	KLM-10
KLM-1/8	KLM-3/4	KLM-4	KLM-15
KLM-3/10	KLM-1	KLM-5	KLM-20
KLM-1/4	KLM-1 1/2	KLM-6	KLM-25
KLM-9/10	KLM-2	KLM-8	KLM-30

CE



Class CC Fuses



KTK-R Limitron® Fuse
Fast Acting; Branch Circuit Fuse
Class CC - Rejection Feature

Physical Size:

1 3/32" × 1 1/2"
 (10.3mm × 38.1mm)

Construction: Melamine Tube
Voltage Rating: 1/10 – 30 Amps.
 600 VAC (or less)†

Interrupting Rating:
 200,000A RMS Sym.

Agency Approvals:
 UL Listed, Std. 248-4, Class CC,
 Guide JDDZ, File E4273
 CSA Certified, C22.2 No. 248.14,
 File 53787, Class 1422-02
 HRC – MISC

†12-30A rated 300 VDC and 10 KAIC.

Catalog Symbol & Current Ratings

600 VAC

KTK-R-1/10	KTK-R-1	KTK-R-7
KTK-R-1/8	KTK-R-1 1/2	KTK-R-8
KTK-R-3/10	KTK-R-2	KTK-R-9
KTK-R-1/4	KTK-R-2 1/2	KTK-R-10
KTK-R-3/10	KTK-R-3	KTK-R-12
KTK-R-1/10	KTK-R-3 1/2	KTK-R-15
KTK-R-1/2	KTK-R-4	KTK-R-20
KTK-R-9/10	KTK-R-5	KTK-R-25
KTK-R-3/4	KTK-R-6	KTK-R-30

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



FNQ-R
Time-Delay, Rejection Type
Branch Circuit Fuse
Class CC

Physical Size:

1 3/32" × 1 1/2"
 (10.3mm × 38.1mm)

Construction: Melamine Tube
Voltage Rating: 600 VAC (or less)†

Interrupting Rating:
 200,000A RMS Sym.

Agency Approvals:
 UL Listed, Std. 248-4, Class CC,
 Guide JDDZ, File E4273
 CSA Certified, C22.2 No. 248.4,
 Class 1422-01, File 53787
 HRC – MISC

†12-30A rated 300 VDC and 10 KAIC.

Catalog Symbol & Current Ratings

600 VAC

FNQ-R-1/4	FNQ-R-1 1/10	FNQ-R-7
FNQ-R-3/10	FNQ-R-1 9/10	FNQ-R-7 1/2
FNQ-R-1/10	FNQ-R-2	FNQ-R-8
FNQ-R-1/2	FNQ-R-2 1/4	FNQ-R-9
FNQ-R-9/10	FNQ-R-2 1/2	FNQ-R-10
FNQ-R-3/4	FNQ-R-2 9/10	FNQ-R-12
FNQ-R-9/10	FNQ-R-3	FNQ-R-15
FNQ-R-1	FNQ-R-3 3/10	FNQ-R-17 1/2
FNQ-R-1 1/8	FNQ-R-3 1/2	FNQ-R-20
FNQ-R-1 1/4	FNQ-R-4	FNQ-R-25
FNQ-R-1 3/10	FNQ-R-5	FNQ-R-30
FNQ-R-1 1/10	FNQ-R-6	—
FNQ-R-1 1/2	FNQ-R-6 1/4	—

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



LP-CC Low-Peak® Fuse
Time-Delay Current Limiting,
Class CC - Rejection Type

Physical Size:

1 3/32" × 1 1/2"
 (10.3mm × 38.1mm)

Construction: Melamine Tube
Voltage Rating: 1/2 – 30 Amps.
 600 VAC (or less)

Interrupting Rating:
 200,000A RMS Sym.

Agency Approvals:
 UL Listed, Std. 248-4, Class CC,
 Guide JDDZ, File E4273
 DC Volt Rating 300 VDC (or less).
 20,000 A.I.R., 1/2-2 1/4A & 20-30A.
 150 VDC or less. 20,000 A.I.R., 3-15A
 CSA Certified, C22.2 No. 248-4,
 HRCI-CC; Class 1422-02, File 53787

Catalog Symbol & Current Ratings

600 VAC

LP-CC-1/4	LP-CC-2 1/4	LP-CC-7
LP-CC-1/2	LP-CC-2 1/2	LP-CC-7 1/2
LP-CC-9/10	LP-CC-2 9/10	LP-CC-8
LP-CC-9/10	LP-CC-3	LP-CC-9
LP-CC-1	LP-CC-3 1/10	LP-CC-10
LP-CC-1 1/8	LP-CC-3 1/2	LP-CC-12
LP-CC-1 1/4	LP-CC-4	LP-CC-15
LP-CC-1 1/10	LP-CC-4 1/2	LP-CC-20
LP-CC-1 1/2	LP-CC-5	LP-CC-25
LP-CC-1 9/10	LP-CC-5 9/10	LP-CC-30
LP-CC-1 9/10	LP-CC-6	—
LP-CC-2	LP-CC-6 1/4	—

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



13/32" and Class G Fuses



FNQ

Time-Delay

Physical Size:

13/32" x 1 1/2" (5AG)
(10.3mm x 38.1mm)

Construction: Fibre Tube

Voltage Rating: 500 VAC or less†

Interrupting Rating: 10,000A

Agency Approvals:

UL Listed, Std. 248-14, Guide JDYX
File E19180

CSA Certified, C22.2 No. 248.14,
Class 1422-01, File 53787

†1-30A rated 250 VDC and 10 KAIC.

Catalog Symbol & Current Ratings

500 VAC

FNQ-1/10	FNQ-9/10	FNQ-37/10	FNQ-9
FNQ-1/6	FNQ-1	FNQ-3 1/2	FNQ-10
FNQ-15/100	FNQ-1 1/6	FNQ-4	FNQ-12
FNQ-3/16	FNQ-1 1/4	FNQ-4 1/2	FNQ-14
FNQ-3/10	FNQ-1 1/2	FNQ-5	FNQ-15
FNQ-1/4	FNQ-1 5/10	FNQ-5 5/10	FNQ-20
FNQ-3/10	FNQ-2	FNQ-6	FNQ-25
FNQ-1/10	FNQ-2 1/4	FNQ-6 1/4	FNQ-30
FNQ-1/2	FNQ-2 1/2	FNQ-7	—
FNQ-9/10	FNQ-3	FNQ-8	—

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



FNM Fusetron® Fuse

Time-Delay

Physical Size:

13/32" x 1 1/2" (5AG)
(10.3mm x 38.1mm)

Construction: Fibre Tube

Voltage Rating: 1/10 – 30 Amps.
250 VAC (or less)

Interrupting Rating: See Table Below.

Agency Approvals:

UL Listed, Std. 248-14, 0-10/250 VAC;
12-15/125 VAC; File E19180, Guide JDYX

CSA Certified, C22.2 No. 248.14,
1-10/250 VAC; Class 1422-01,
12-15/125 VAC; File 53787

DC Rating: 1-15A rated 125 VDC and
1.6 KAIC.

Catalog Symbol & Current Ratings

250 VAC	IR	250 VAC	IR
FNM-1/10		FNM-1 1/6	
FNM-1/6		FNM-1 1/4	
FNM-15/100		FNM-1 1/10	
FNM-3/10		FNM-1 1/2	100A
FNM-1/4		FNM-1 5/10	@ 250 VAC
FNM-3/10	35A	FNM-1 9/10	10,000A
FNM-1/10	@ 250 VAC	FNM-2	@ 125 VAC
FNM-1/10	10,000A	FNM-2 1/4	
FNM-1/2	@ 125 VAC	FNM-2 1/2	
FNM-9/10		FNM-2 5/10	
FNM-3/4		FNM-3	
FNM-9/10		FNM-3 3/10	
FNM-1		FNM-3 1/2	
—		—	

250 VAC	IR	125 VAC	IR
FNM-4		FNM-12	
FNM-4 1/2		FNM-15	10,000A
FNM-5		—	@ 125 VAC
FNM-5 5/10	200A	—	
FNM-6	@ 250 VAC	32 VAC	
FNM-6 1/4	10,000	FNM-20	
FNM-7	@ 125 VAC	FNM-25	
FNM-8		FNM-30	
FNM-9		—	
FNM-10		—	

If 250 VAC is needed for 12-30 amps, use FNW Series.

CE



SC

Time-Delay, Class G

Physical Size:

Fuse (Amps) **A (±.003)**
x 13/32 (±.006)

SC-1 to -15	1.31"
SC-20	1.41"
SC-25 to -30	1.63"
SC-35 to -60	2.25"

Construction: Melamine Tube

Voltage Rating: 480 VAC or less*

Interrupting Rating: 100,000A
RMS Sym.

Agency Approvals:

UL Listed, Std. 248-5, Class G,
Guide JDDZ, File E4273

CSA Certified, C22.2 No. 248.5,
Class 1422-01, File 53787

*25-60A rated 300 VDC and 10 KAIC.

Catalog Symbol & Current Ratings

SC-1/2	SC-6	SC-25
SC-1	SC-7	SC-30
SC-1 1/2	SC-8	SC-35
SC-2	SC-9	SC-40
SC-2 1/2	SC-10	SC-45
SC-3	SC-12	SC-50
SC-4	SC-15	SC-60
SC-5	SC-20	—

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



Various Sizes



GLD and GBA

Fast Acting

Physical Size:

1/4" x 1 1/4" (3AG)
(6.6mm x 31.8mm)

Agency Approvals:

UL Listed, Std. 248-14, 0-5A/125 VAC,
10,000 AIC, Guide JDYX,
File E19180

UL Recognized,
6A/125 VAC, 1000 AIC
8-15A/150V AC/DC, 300 AIC
Guide JDYX2, File E19180

CSA Certified, C22.2, No. 248.14,
0-5A/125 VAC, 10,000 AIC
Class 1422-01, File 53787

General Information: Type **GLD**
has an Albaloy-plated pin for positive,
electrical signal circuit activation. Type
GBA has a "red" pin for high visibility.

Catalog Symbol & Current Ratings

125 VAC

GLD-1/2	GLD-2	GLD-6
GLD-3/4	GLD-3	GLD-10
GLD-1	GLD-4	GLD-12
GLD-1 1/2	GLD-5	GLD-15

125 VAC

GBA-1/2	GBA-2	GBA-8
GBA-3/4	GBA-3	GBA-10
GBA-1	GBA-4	GBA-15
GBA-1 1/2	GBA-5	—

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



MIC and MIN

Fast Acting

Physical Size:

1 3/32" x 1 1/2" (5AG)
(10.3mm x 38.1mm)

Agency Approvals:

MIC—0-15A UL Listed, Std. 248-14,
Guide JDYX, File E19180

MIN—1-5A CSA Certified, C22.2
No. 248.14, Class 1422-01,
File 53787

General Information: Type **MIC**
has a silver-plated pin for positive,
electrical signal activation. Type
MIN has a "red" pin for high visibility.

Catalog Symbol & Current Ratings

250 VAC		32 VAC
MIC-1	MIC-5	MIC-20
MIC-2	MIC-10	MIC-25
MIC-3	MIC-15	MIC-30

250 VAC		32 VAC
MIN-1	MIN-5	MIN-20
MIN-2	MIN-10	MIN-25
MIN-3	MIN-15	MIN-30

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

BIF document: 2047



FNA

Time-Delay

Physical Size:

1 3/32" x 1 1/2" (5AG) 1/10-10A
(10.3mm x 38.1mm)

Agency Approvals:

UL Recognized, Std. 248-14, 0-8A,
10A/250 VAC Guide JDYX,
File E19180

CSA Certified, C22.2 No. 248.14,
0-10/125 VAC, Class 1422-01,
File 53787

UL Listed, Std. 248-14,
0-8 1/10 A/250 VAC,
1-15A/125 VAC; Guide JDYX,
File 19180

CSA Certified, C22.2 No. 248.14,
0-8 1/10 A/250 VAC, 1-10A/125 VAC,
Class 1422-01, File 53787

General Information:

Fuses above 10A have dual-tube
construction.

Catalog Symbol & Current Ratings

250 VAC IR*	125 VAC IR	125 VAC IR	125 VAC
FNA-1/10	FNA-1	FNA-3	FNA-9
FNA-1/8	FNA-1 1/8	FNA-3 1/10	FNA-10 IR
FNA-15/100	FNA-1 1/4	FNA-3 1/2	FNA-12 10,000A
FNA-3/10	FNA-1 1/2	FNA-4	FNA-15
FNA-1/4 IR	FNA-1 1/2 IR	FNA-4 1/2 IR	32 VAC
FNA-3/10 35A	FNA-1 5/10 10,000A	FNA-5 10,000A	FNA-20
FNA-1/2	FNA-1 3/4	FNA-5 1/2	FNA-25
FNA-9/10	FNA-2	FNA-6	FNA-30
FNA-1/2	FNA-2 1/4	FNA-6 1/2	—
FNA-3/4	FNA-2 1/2	FNA-7	—
FNA-9/10	FNA-2 3/4	FNA-8	—

*All have interrupting rating of 10,000A at 125 VAC.

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

BIF document: 2029

BIF document: 2012



1 3/32" x 2"

Limiters



MIS

**Non-Time-Delay
Physical Size:**

1 3/32" x 2"
(10.3mm x 50.8mm)

Voltage Rating: 600 VAC

Interrupting Rating: 200,000 AIC

Catalog Symbol & Current Ratings

600 VAC

MIS-1	MIS-4	MIS-10
MIS-2	MIS-5	MIS-12
MIS-3	MIS-8	

Test Specifications

Fuse	Load	Opening Time
All	110%	4 hrs. (min.)
1-5A	150%	6 min. (max.)
6-12A	150%	12 min. (max.)



KAZ

**Actuator (Not a Fuse)
Physical Size:**

1 3/32" x 2"
(10.3mm x 50.8mm)

Voltage Rating: 600 VAC

Interrupting Rating: 200,000A

Agency Approvals:

UL Listed, Guide JDVS,
File E58836

Recommended Use: Mounts in
Buss signal blocks 2778, 2837 and
2838.

General Information: Connects in
parallel with fuses having a rating of
50 amperes or larger and opens at
10A or more.

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



ANN Limiter

**Very Fast Acting
Physical Size:**

7/8" x 3 3/16" (22.2mm x 81.0mm)

Voltage Rating: 125 VAC

Interrupting Rating: 2500 AIC

Agency Approvals:

UL Recognized, 35-400 Amps
Guide JFHR2, File E56412

Catalog Symbol & Current Ratings

125 VAC, IR 2500A @ 125 VAC

ANN-10	ANN-90	ANN-225	ANN-400
ANN-35	ANN-100	ANN-250	ANN-500
ANN-40	ANN-125	ANN-275	ANN-600
ANN-50	ANN-150	ANN-300	ANN-700
ANN-60	ANN-175	ANN-325	ANN-800
ANN-80	ANN-200	ANN-350	—

BIF document: 2023

ANL

Non-Time Delay

Voltage Rating: 32 VAC

Interrupting Rating: 6000 AIC

Agency Approvals:

UL Recognized, 600, 675 and
750 Amps/32V
Guide JFHR2, File E56412

Catalog Symbol & Current Ratings

32 VAC

IR 6000A			IR 2700A
ANL-35	ANL-130	ANL-300	ANL-600
ANL-40	ANL-150	ANL-325	ANL-675
ANL-50	ANL-175	ANL-350	ANL-750
ANL-60	ANL-200	ANL-400	—
ANL-80	ANL-225	ANL-500	—
ANL-100	ANL-250	—	—
ANL-125	ANL-275	—	—

BIF document: 2024



BIF document: 2085

BIF document: 2021

In-Line Fuses and Fuseholders

GLR

Fast Acting, Non-rejecting
Voltage Rating: 300 VAC or less
Interrupting Rating: 10,000A
Agency Approvals:
 UL Listed, Std. 248-14,
 0-15A/300 VAC
 Guide JDYX, File E19180
 CSA Certified, C22.2 No. 248.14,
 0-10A/300 VAC, Class 1422-01,
 File 53787

Electrical Ratings for Type GLR Fuses and Non-Rejection Style Carriers

Fuse	Carrier*	Fuse	Carrier*
GLR- $\frac{3}{16}$	HLR	GLR-5	HLR
GLR- $\frac{1}{2}$	HLR	GLR-6	HLR
GLR-1	HLR	GLR-7	HLR
GLR-1 $\frac{1}{2}$	HLR	GLR-8	HLR
GLR-1 $\frac{9}{10}$	HLR	GLR-9	HLR
GLR-2	HLR	GLR-10	HLR
GLR-3	HLR	GLR-12	HLR
GLR-4	HLR	GLR-15	HLR

* Carrier is UL Recognized, Guide IZLT2, File E14853 and CSA Certified, Class 6225-01, File 47235 15A, 300 VAC.



BIF document: 2032

HLR Fuseholder



GMF and GRF

Time Delay, Non-rejecting
Voltage Rating: 300 VAC or less
Interrupting Rating: 10,000A
Agency Approvals: 0-6.25A
 UL Listed, Std. 248-14,
 Guide JDYX, File E19180
 CSA Certified, C22.2 No. 248.14,
 Class 1422-01, File 53787

Electrical Ratings for Type GMF and GRF Fuses and Non-Rejection Style Carriers

Fuse	Carrier*	Fuse	Carrier*
GMF- $\frac{3}{10}$	HLR	GMF-2 $\frac{1}{10}$	HLR
GMF- $\frac{1}{2}$	HLR	GMF-3	HLR
GMF- $\frac{9}{10}$	HLR	GMF-3 $\frac{3}{10}$	HLR
GMF- $\frac{9}{10}$	HLR	GMF-4	HLR
GMF-1	HLR	GMF-5*	HLR
GMF-1 $\frac{1}{4}$	HLR	GMF-6 $\frac{1}{4}$	HLR
GMF-1 $\frac{9}{10}$	HLR	GRF-7**	HLR
GMF-2	HLR	GRF-8**	HLR
GMF-2 $\frac{1}{2}$	HLR	GRF-10**	HLR

* Carrier is UL Recognized, Guide IZLT2, File E14853 and CSA Certified, Class 6225-01, File 47235 15A, 300 VAC.

**125 VAC



BIF document: 2031

GLQ

Fast-Acting, Size Rejecting
Voltage Rating: 300 VAC or less
Interrupting Rating: 10,000A
Agency Approvals:
 UL Listed, Std. 248-14,
 Guide JDYX, File E19180
 CSA Certified, C22.2 No. 248.14,
 Class 1422-01, File 53787

Electrical Ratings for Type GLQ Fuses and Rejection Style Carriers

Fuse	Carrier*	Fuse	Carrier*
GLQ-1	HLQ-1 $\frac{1}{10}$	GLQ-3	HLQ-3 $\frac{3}{10}$
GLQ-1 $\frac{1}{2}$	HLQ-1 $\frac{1}{10}$	GLQ-4	HLQ-5
GLQ-1 $\frac{9}{10}$	HLQ-1 $\frac{1}{10}$	GLQ-5	HLQ-5
GLQ-2	HLQ-3 $\frac{3}{10}$	GLQ-9	HLQ-10
GLQ-2 $\frac{1}{2}$	HLQ-3 $\frac{3}{10}$	GLQ-10	HLQ-10

* Carrier is UL Recognized, Guide IZLT2, File E14853 and CSA Certified, Class 6225-01, File 47235 10A, 300 VAC.



BIF document: 2033

HLQ Fuseholder



GMQ

Time-Delay, Size Rejecting
Voltage Rating: 300 VAC or less
Interrupting Rating: 10,000A
Agency Approvals:
 UL Listed, Std. 248-14,
 Guide JDYX, File E19180
 CSA Certified, C22.2 No. 248.14,
 Class 1422-01, File 53787
 UL Recognized

Electrical Ratings for Type GMQ Fuses and Rejection Style Carriers

Fuse	Carrier*	Fuse	Carrier*
GMQ- $\frac{1}{2}$	HLQ- $\frac{1}{2}$	GMQ-2 $\frac{1}{2}$	HLQ-3 $\frac{3}{10}$
GMQ- $\frac{9}{10}$	HLQ-1 $\frac{1}{10}$	GMQ-3	HLQ-3 $\frac{3}{10}$
GMQ- $\frac{9}{10}$	HLQ-1 $\frac{1}{10}$	GMQ-3 $\frac{3}{10}$	HLQ-3 $\frac{3}{10}$
GMQ-1	HLQ-1 $\frac{1}{10}$	GMQ-4	HLQ-5
GMQ-1 $\frac{1}{4}$	HLQ-1 $\frac{1}{10}$	GMQ-6	HLQ-8
GMQ-1 $\frac{9}{10}$	HLQ-1 $\frac{1}{10}$	GMQ-6 $\frac{1}{4}$	—
GMQ-2	HLQ-3 $\frac{3}{10}$	—	—

* Carrier is UL Recognized, Guide IZLT2, File E14853 and CSA Certified, Class 6225-01, File 47235 10A, 300 VAC.



BIF document: 2030



Blade-Type Fuses



ATC® Blade-Type Fuse

Fast Acting

Voltage Rating: 32 Volts

Agency Approvals:

UL Recognized, (3-40A)

Guide JFHR2, File E56412

Catalog Symbol & Current Ratings

ATC-1	Black
ATC-2	Gray
ATC-3	Violet
ATC-4	Pink
ATC-5	Tan
ATC-7½	Brown
ATC-10	Red
ATC-15	Blue
ATC-20	Yellow
ATC-25	Clear
ATC-30	Green
ATC-40	Amber

Refer to page 40 for In-Line Fuse Holders for Blade Type Fuses.



ATM Mini®-Fuse

Fast Acting

Voltage Rating: 32 Volts

Catalog Symbol & Current Ratings

ATM-2	Gray
ATM-3	Violet
ATM-4	Pink
ATM-5	Tan
ATM-7½	Brown
ATM-10	Red
ATM-15	Lt. Blue
ATM-20	Yellow
ATM-25	Natural White
ATM-30	Green



MAX Maxi®-Fuse

Fast Acting

Voltage Rating: 32 Volts

Catalog Symbol & Current Ratings

MAX-20	Yellow
MAX-30	Green
MAX-40	Orange
MAX-50	Red
MAX-60	Blue



5mm × 20mm



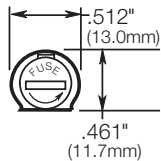
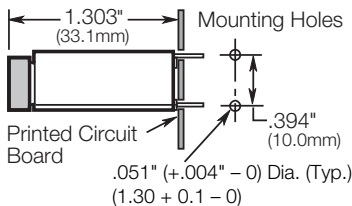
HTC-45M

PCB Vertical Mount

250 VAC, 6.3A, 2.5W

Bayonet Cap/Carrier

See specifications below



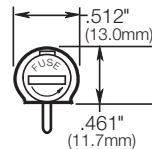
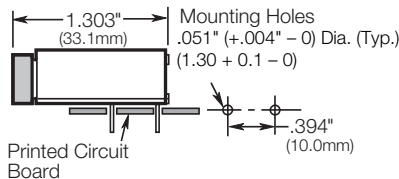
HTC-50M

PCB Horizontal Mount

250 VAC, 6.3A, 2.5W

Bayonet Cap/Carrier

See specifications below



HTC-60M, HTC-65M

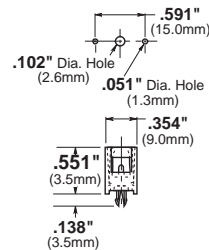
PC Board Mount

250 VAC, 6.3A

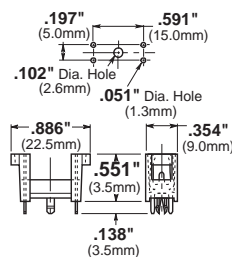
Body Material: Valox DR48

Terminals: Phosphor bronze

HTC-60M (2 legs)



HTC-65M (4 legs)



BIF document: 2110

Specifications

Terminals: For HTC-45M, HTC-50M: Tin-plated.

Molded Materials: High temperature thermoplastic that meets the flammability ratings of UL 94VO;
Glow Wire Test: 960°C per IEC 695-2-1.

Solderability: In accordance with IEC 68-2-20.

Electrical: Contact Resistance: ≤ 10mΩ;
Insulation Resistance: ≥ 10mΩ;
Dielectric Strength ≥ 2000 VAC.

Shock Safety: PC2 (fuseholders).

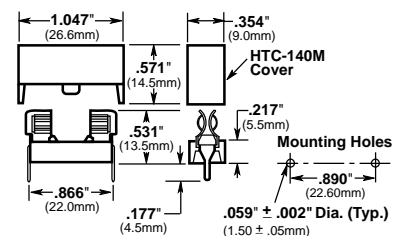
Agency Approvals: HTC-45M, HTC-50M: UL Recognized, Guide IZLT2, File E14853; 6.3A, 250V; CSA Certified, Class 6225-01, File 47235; 10A, 250V Semko: (963107301; 6.3A, 250V).

Packaging: Standard Qty 10 (No Prefix), Bulk Qty. 100 (Prefix Catalog Number with BK/).

HTC-15M, HTC-140M & HTC-150M

PCB Fuseblock & Snap-On Cover

250 VAC, 6.3A, 1.6W

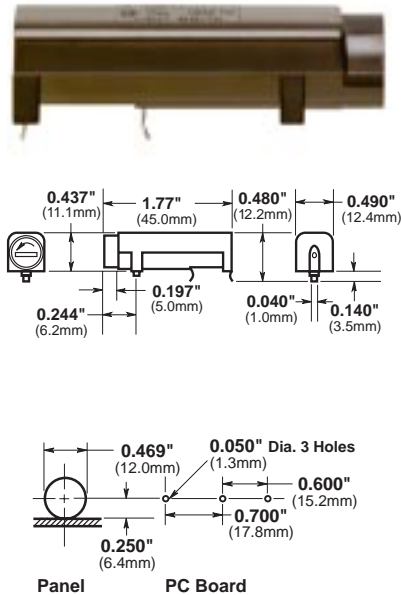


CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



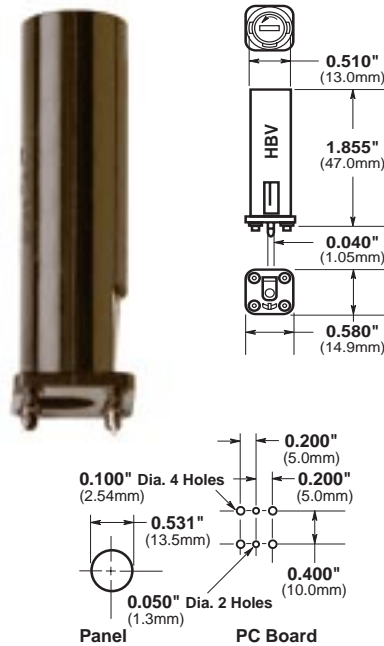
5mm × 20mm or 1/4" × 1 1/4" (International Series)

HBH-I (for 1/4" × 1 1/4" fuses)
HBH-M (for 5mm × 20mm fuses)
Horizontal Mount



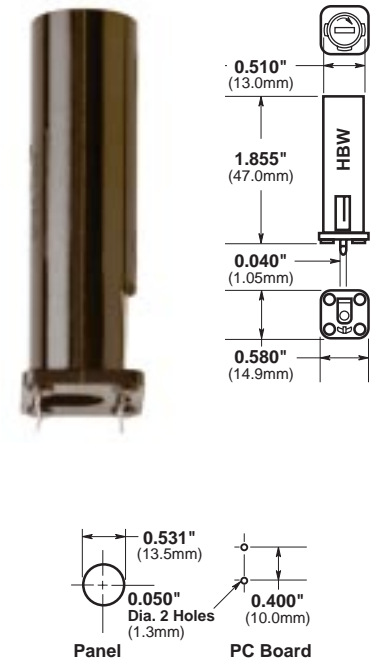
BIF document: 2118

HBV-I (for 1/4" × 1 1/4" fuses)
HBV-M (for 5mm × 20mm fuses)
Vertical Mount with Stability Pins



BIF document: 2118

HBW-I (for 1/4" × 1 1/4" fuses)
HBW-M (for 5mm × 20mm fuses)
Vertical Mount without Stability Pins



BIF document: 2118

Fuseholder Caps (Fit all three shown above)



Specifications

Electrical Ratings: UL — 16A @ 250V; CSA — 12A @ 250V; VDE — 10A @ 250V; SEMKO — 10A @ 250V
 Insulation resistance — 10,000 megohm at 500 VDC. Contact resistance — less than 0.005 ohms @ 20mV. Dielectric strength — over 200 volts/mil.

Molded Material: High dielectric molded phenolic with a UL 94VO flammability rating.

Fuse Carrier & Knob: Spring-loaded, bayonet type. Tin-plated brass. Screwdriver slotted.

Mounting: "Kicked" terminals (all models) and stabilizer pins on HBV model for increased stability.

Environmental: Min./Max. operating temperature — (-40°C to +85°C).

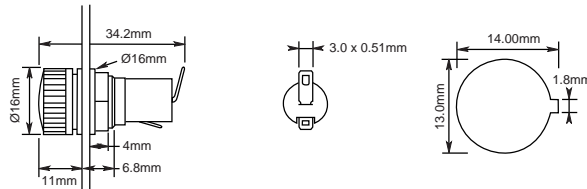
Agency Approvals: UL Recognized — Guide IZLT2, File EI4853;
 CSA Certified — Class 6225-01, File 47235
 VDE — 41421
 SEMKO — 9308147 (HBH, HBV) 9222106 (HBW)



5mm x 20mm

HTC-30M

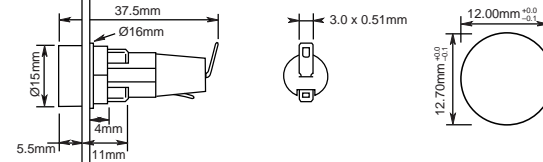
Ratings: 250 VAC, 6.3A, 2.5W
Screwdriver slot



BIF document: 2110

HTC-35M

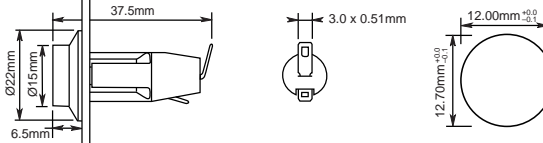
Ratings: 250 VAC, 6.3A, 2.5W
Threaded cap



BIF document: 2110

HTC-40M

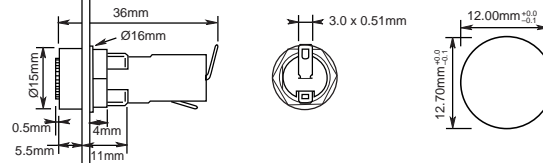
Ratings: 250 VAC, 6.3A, 2.5W
Screwdriver slot



BIF document: 2110

HTC-55M

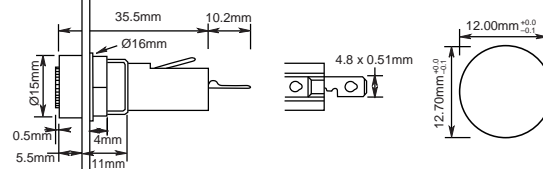
Ratings: 250 VAC, 6.3A, 2.5W
Bayonet Cap/Carrier



BIF document: 2110

HTC-70M

Ratings: 250 VAC, 10A, 2.5W
Bayonet Cap/Carrier



BIF document: 2110

Specifications

Terminals: Brass, tin-plated.

Molded Materials: High temperature thermoplastic that meets the flammability ratings of UL 94VO; Glow Wire Test: 960°C per IEC 695-2-1.

Solderability: In accordance with IEC 68-2-20.

Agency Approvals: UL Recognized — Guide IZLT2, File E14853;
CSA Certified — Class 6225-01, File 47235;
SEMKO — 9502189 (HTC-35M, HTC-40M, HTC-55M and HTC-70M)

Electrical: Contact Resistance: ≤ 10mΩ; Insulation Resistance: ≥ 10mΩ; Dielectric Strength ≥ 2000 VAC.

Shock Safety: PC2 (fuseholders).

Packaging: Standard Qty 10 (No Prefix), Bulk Qty 100 (Prefix Catalog Number with BK/).



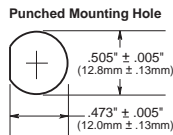
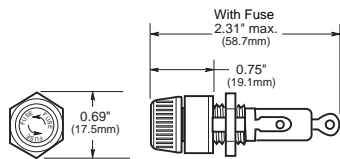
1/4" × 1 1/4"



HKP, HKP-L, HKP-W Standard Fuseholders

Electrical Ratings for HKP Series

Catalog Symbol	Amps	VAC	Fuse Description
HKP	30	250	—
HKP-L	30	250	HKP with 2250V stand-off barrier.
HKP-W	30	250	HKP with drip-proof knob.



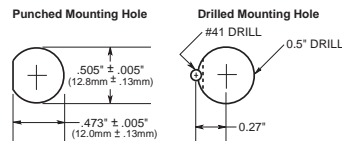
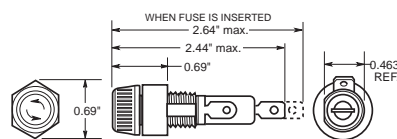
BIF document: 2106



HKP-BBHH, HKP-HH and HKP-LW-HH Fuseholders with 1/4" Quick-connects

Electrical Ratings for HKP Series

Catalog Symbol	Amps	VAC	Fuse Description
HKP-BBHH	15	250	HKP with 1/4" quick connects, nut and washer assembled.
HKP-HH	15	250	HKP with 1/4" quick-connect.
HKP-LW-HH	15	250	HKP with drip-proof knob, 2250V stand-off barrier and quick-connects.



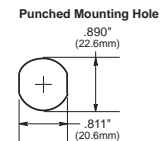
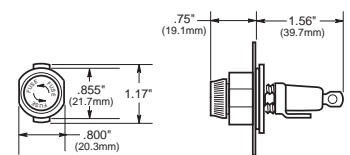
BIF document: 2106



HKP-OO Snap-Lock Fuseholders

Electrical Ratings for HKP Series

Catalog Symbol	Amps	VAC	Fuse Description
HKP-OO	30	250	HKP with snap-lock.



BIF document: 2106

Specifications

- Terminals:** Bayonet-type knob.
Vibration resistant.
For panels up to 5/16" (7.9mm) thick.

- Agency Approvals:** UL Recognized — Guide IZLT2, File E14853
CSA Certified — Class 6225-01, File 47235

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



5mm × 20mm or ¼" × 1¼" (International Series)



HTB Series

Fuseholders with Knob-Type Carriers and with Screwdriver Slotted Carrier
Agency Approvals:

UL Recognized — Guide IZLT2, File E14853
 20A (¾" quick-connect 15A) @ 250 VAC
 CSA — 16A @ 250 VAC Class 6225-01, File E47235;
 Screwdriver slot carrier only
 VDE — 10A @ 250 VAC, 49890
 SEMKO — 10A @ 250 VAC, 8945092, 9005230
Electrical Data: Insulation resistance (per IEC #257) —
 10,000 ohms @ 500 VDC; contact resistance (per IEC #257) —
 0.005 ohms max. @ 1A; stand-off voltage (per IEC #257) —
 480V/Mil @ .125 in. thickness.

Environmental: Min./Max. operating temperature -55°C to 85°C.

Molded Components: High temperature, flame retardant, thermoplastic; UL Component Recognized; 94VO; mounting nut, spacer-black polycarbonate.

Terminals: Tin-plated brass.

Mounting: Withstands 15 to 20 lbs-ins torque to mounting nut when mounting fuseholder to panel. Maximum panel thickness 0.300 inches.

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Dimensional Data

Knob Type Carrier	Maximum Panel Thickness	Terminal Options				Carrier Options	
		Solder/ ¾" Quick-Connect		¼" Quick-Connect		¼" × 1¼" ("I" Equals Inches)	5mm × 20mm ("M" Equals Metric)
		In-Line	Rt. Angle	In-Line	Rt. Angle	Knob	Knob
Common Dimensional Data: Length (Knob Type) - 1.69" (42.9mm) Plus In-Line Terminal (Screwdriver Slotted) 1.75" (44.5mm) NOTE: Plus In-Line Terminal							
 Low Profile Rear Hex Nut	0.30" 7.62mm	HTB-22I	HTB-24I	HTB-26I	HTB-28I	✓	—
 High Profile Rear Hex Nut	0.125" 3.18mm	HTB-22M	HTB-24M	HTB-26M	HTB-28M	—	✓
 Front Hex Nut	0.30" 7.62mm	HTB-42I	HTB-44I	HTB-46I	HTB-48I	✓	—
 Low Profile Snap-In	0.125" 3.18mm	HTB-62I	HTB-64I	HTB-66I	HTB-68I	—	✓
		HTB-82I	HTB-84I	HTB-86I	HTB-88I	✓	—
		HTB-82M	HTB-84M	HTB-86M	HTB-88M	—	✓

Fuseholders and fuse carriers may be ordered separately.



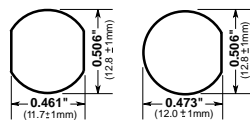
5mm × 20mm or 1/4" × 1 1/4" (International Series)

Dimensional Data

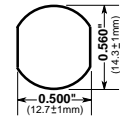
Screwdriver Slotted Type Carrier	Maximum Panel Thickness	Terminal Options				Carrier Options	
		Solder/ 3/16" Quick-Connect		1/4" Quick-Connect		1/4" × 1/4" ("I" Equals Inches)	5mm × 20mm ("M" Equals Metric)
		In-Line	Rt. Angle	In-Line	Rt. Angle	Screwdriver	Screwdriver
Common Dimensional Data: Length (Knob Type) - 1.69" (42.9mm) Plus In-Line Terminal (Screwdriver Slotted) 1.75" (44.5mm) NOTE: Plus In-Line Terminal							
	0.30" / 7.62mm	HTB-32I	HTB-34I	HTB-36I	HTB-38I	✓	—
	0.125" / 3.18mm	HTB-52I	HTB-54I	HTB-56I	HTB-58I	✓	—
	0.125" / 3.18mm	HTB-92I	HTB-94I	HTB-96I	HTB-98I	✓	—
		HTB-32M	HTB-34M	HTB-36M	HTB-38M	—	✓
		HTB-52M	HTB-54M	HTB-56M	HTB-58M	—	✓
		HTB-92M	HTB-94M	HTB-96M	HTB-98M	—	✓

Fuseholders and fuse carriers may be ordered separately.

Common Mounting Hole for:
HTB-2, -3, -4, -5, and -6



HTB-8, and -9



Ordering Information

	HTB-				S	P	FUSE CARRIER ONLY			
Packaging (Blank) – Std. BK/ – Bulk	Product Symbol		Fuse Carrier I – 1/4" x 1-1/4" M – 5mm x 20mm	Splash Proof (Optional on -2, -4, -6, and -8)			Packaging (Blank) – Std. BK/ – Bulk	Product Symbol FT – Knob Type (For 20, 40, 60, and 80 Series Only) ST – Screwdriver Slotted (For 30, 50, and 90 Series Only)	Fuse Carrier I – 1/4" x 1-1/4" M – 5mm x 20mm	
Body Configuration and Mounting Finger Grip Holders 2 – Low Profile (Rear Panel Hex-Nut) 4 – High Profile *6 – (Front Panel Hex-Nut) 8 – Low Profile (Snap-In)		Rear Terminal Configuration 2 – Solder/3/16" Quick-Connect (In-Line) 4 – Solder/3/16" Quick-Connect (Right Angle) 6 – 1/4" Quick-Connect (In-Line) 8 – 1/4" Quick-Connect (Right Angle)								
Screwdriver-Slotted Holders 3 – Low Profile 5 – High Profile 9 – Low Profile (Snap-In)										

*Profile varies with panel thickness. Holder installs through rear of panel.

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



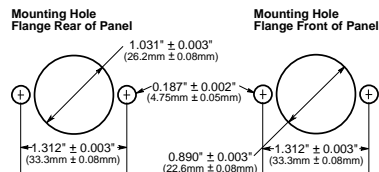
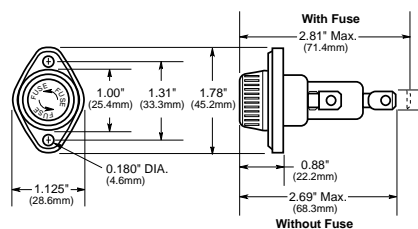
1 3/32" Diameter



HPF Standard Fuseholders with Screw-type Knob for 1 3/32" x 1 5/16" to 1 1/2" Fuses

Agency Approvals:

UL Recognized, Guide IZLT2,
File E14853
CSA Certified, Class 6225-01,
File 47235
UL 94VO Flammability Rating.



Electrical Ratings

Catalog Symbol	Amps	VAC	Fuse Description
HPF	30	600	1 1/2" (38.1mm)
HPF-C	15	250	1 1/2" (38.1mm) clear knob.
HPF-L	5	600	BBS, 1 3/32" x 1 3/8" fuses.
HPF-EE	15	480	SC 0-15, 1 3/32" x 1 1/16" fuses.
HPF-JJ	20	480	SC 20, 1 3/32" x 1 1 3/32" fuses.
HPF-FF*	30	300	SC 25 & 30, 1 3/32" x 1 1/8" fuses.
HPF-RR	30	600	KTK-R, LP-CC & FNQ-R class CC fuses.
HPF-WT	30	600	Splash-proof knob.
HPF-F-EE*	15	480	Sleeve on body, leaded for 1 3/32" x 1 1/16" fuses.

*No CSA Certification

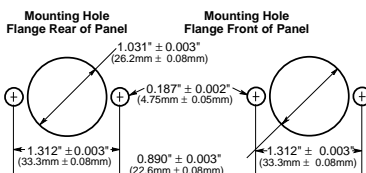
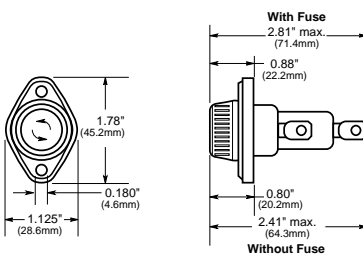
CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



HPS Standard Fuseholders with Bayonet-type Knob for 1 3/32" x 1 5/16" to 1 1/2" Fuses

Agency Approvals:

UL Recognized, Guide IZLT2,
File E14853
CSA Certified, Class 6225-01,
File 47235
UL 94VO Flammability Rating.



Electrical Ratings

Catalog Symbol	Amps	VAC	Fuse Description
HPS	30	600	1 1/2" (38.1mm)
HPS-C**	15	250	1 1/2" (38.1mm) clear knob.
HPS-L	5	600	BBS, 1 3/32" x 1 3/8" fuses.
HPS-EE	15	480	SC 0-15, 1 3/32" x 1 1/16" fuses.
HPS-JJ	20	480	SC 20, 1 3/32" x 1 1 3/32" fuses.
HPS-FF**	30	300	SC 25 & 30, 1 3/32" x 1 1/8" fuses.
HPS-RR**	30	600z	KTK-R, LP-CC, FNQ-R class CC fuses.
HPS-W**	30	600	1 3/32" x 1 1/2" - Drip-proof knob.

* No UL Recognition

**No CSA Certification

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

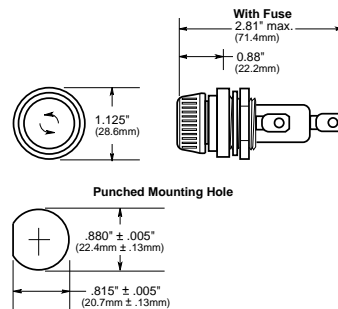
BIF document: 2113



HPG and HPD Standard Fuseholders with Bayonet-type Knob for 1 3/32" x 1 1/2" Fuses

Agency Approvals:

UL Recognized, Guide IZLT2,
File E14853
UL 94VO Flammability Rating.



Electrical Ratings

Catalog Symbol	Amps	VAC	Fuse Description
HPG	30	600	Only side terminal is a quick-connect; rear terminal 3/16" longer than HPD.
HPD	30	600	Rear terminal is 3/16" shorter than HPG.

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

BIF document: 2108

BIF document: 2114



1 3/32" x 1 1/2"

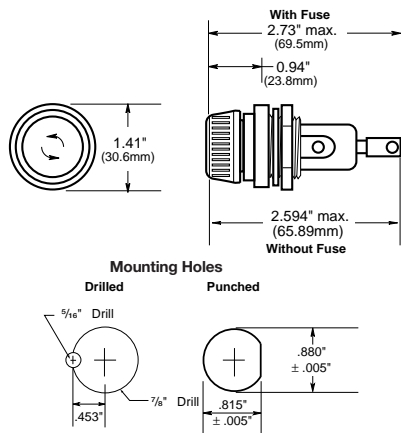


HPM
Standard Fuseholder with
Screw-type Knob for
1 3/32" x 1 1/2" Fuses

Ratings: 600 VAC, 30A

Agency Approvals:

UL Recognized, Guide IZLT2,
File E14853
CSA Certified, Class 6225-01,
File 47235
UL 94VO Flammability Rating.



Electrical Ratings

Catalog Symbol	Amps	VAC	Fuse Description
HPM	30	600	1/4" quick-connect/solder
HPM-D	30	600	Splash-proof knob

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

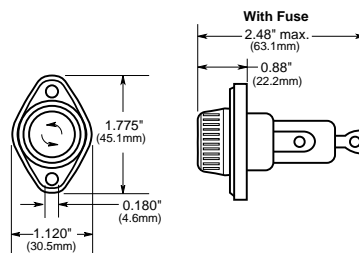


HPC-D
Waterproof Fuseholder with
Screw-type Knob for
1 3/32" x 1 1/2" Fuses

Ratings: 600 VAC, 30A

Agency Approvals:

UL Recognized, Guide IZLT2,
File E14853
UL 94VO Flammability Rating.



Electrical Ratings

Catalog Symbol	Amps	VAC	Fuse Description
HPC-D	30	600	Mount in panels up to 1/4" thick.

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



1/4" Diameter (Indicating Type)



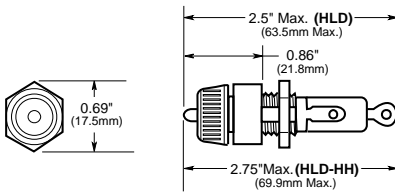
HLD

For 1/4" x 1 1/4" Pin
Indicating Fuses

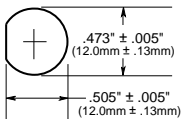
Ratings: 250 VAC, 15A

Agency Approvals:

UL Recognized, File E14853,
Guide IZLT2



Punched Mounting Hole



Electrical Ratings

Symbol	Amps	VAC	Features
HLD	15	250	Solder terminals
HLD-HH	15	250	1/4" quick-connect terminals

Use w/GBA, GLD Fuses

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

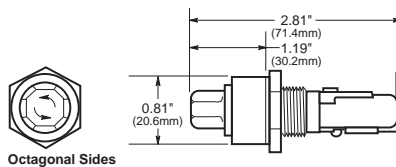


HJL

Lamp Indicating
for 1/4" x 1" Fuses

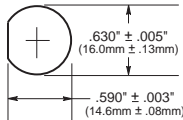
Ratings: 250 VAC, 15A

No Agency Approvals



Octagonal Sides

Punched Mounting Hole



Electrical Ratings

Symbol	Amps	Lamp		Knob	
		VAC	Type	Color	Type
HJL	15	90 to 250	Neon	Clear	Oct

Use w/AGX/MKB Series Fuses
For panels up to 1/8" thick.

BIF document: 2121



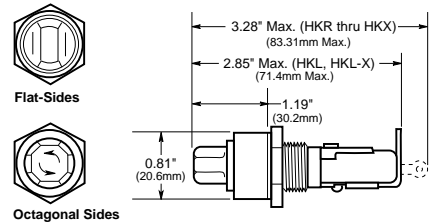
HK Series

Lamp Indicating
for 1/4" x 1 1/4" Fuses

Ratings: 250 VAC, 15A or 20A

Agency Approvals:

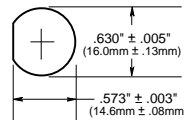
UL Recognized, Guide IZLT2,
File E14853
CSA Certified, Class 6225-01,
File 47235



Flat-Sides

Octagonal Sides

Punched Mounting Hole



Electrical Ratings

Symbol	Amps	Lamp		Knob	
		VAC	Type	Color	Type
HKL*	15	90 to 250	Neon	Clear	Oct
HKL-X*					FS
HKR	20	22 to 30	**	Amber	Oct
HKT		13 to 22	**		Oct
HKU		4 to 6	**	Red	Oct
HKX		22 to 33	**	Amber	FS

* UL Recognized and CSA Certified
** Incandescent

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

BIF document: 2120

BIF document: 2105



5mm or 1/4" Diameter



HHT

In-Line Fuseholder

for 5 x 15mm or 5 x 20mm Fuses

Ratings: 5 x 15mm; 32 VAC, 5A
5 x 20mm; 32 VAC, 10A

Construction:

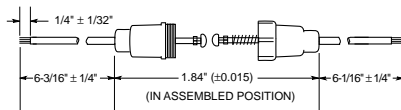
Body - Black Thermoplastic;
Terminals - Brass

Pull Force: Withstands 10 lbs. pull

Catalog Numbers

Description/Qty.	Catalog Number
Standard Pack (10-in)	HHT
Bulk Pack (100-in)	BK/HHT

Dimensional Data



HHB

Universal In-Line Fuseholder

for 1/4" x 7/8", 1" & 1 1/4" Fuses

Ratings: 32 VAC, 30A

Construction:

Body - Nylon;
Contacts - Albaloy-plated copper

Pull Force: 5 lbs. minimum to separate fuseholder housing with fuse installed.

UL Flammability: 94VO

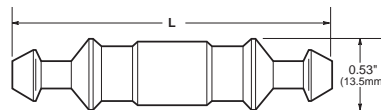
Catalog Numbers

Holder (Without Leads)	
Description	Catalog Number
Standard Pack (10-in)	HHB
Bulk Pack (100-in)	BK/HHB

Holder With Pre-attached Lead Wires

#14 Insulated		
Wire Color	19" Length	8" Length
Yellow	BK/HHB-Y419	BK/HHB-Y408
Red	BK/HHB-R419	BK/HHB-R408
Black	BK/HHB-B419	BK/HHB-B408

Dimensional Data



Fuse Length	Fuseholder Length "L"
7/8" (AGW)	2.100 Max.
1" (AGX)	2.250 Max.
1 1/4" (AGC, MDL)	2.420 Max.

- Accepts #12 to #18 wire leads (not provided with basic fuseholder).



HRK

Universal In-Line Fuseholder

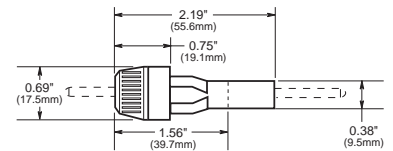
for 1/4" x 7/8" to 1 1/4" Fuses

Ratings: 32 VAC, 15A

Electrical Ratings

Catalog Symbol	Amps	VAC	Fuse Description
HRK	15	32	1/4" diameter fuses of different lengths.

Dimensional Data



- Three springs furnished with fuseholder afford acceptance of 1/4" fuses of different lengths.
- Wire leads are staked and soldered to the contacts of the fuseholder.
- Leads are 8" (203mm) long.
- Wire size - #14.



1/4" Diameter



HR and HM Series
In-Line Fuseholders for SFE
and 1/4" x Various Length Fuses
Ratings: 32 VAC, 20A
No agency listings.

Electrical Ratings

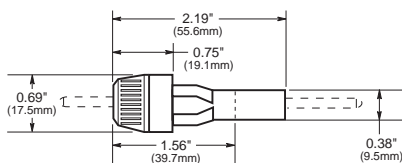
Catalog Symbol	Includes Fuse	Wire
HRJ*	SFE-20	19" of #14
HRI	SFE-14	
HRH	SFE-9	
HRE	SFE-7 1/2	
HRG	SFE-6	
HRF	SFE-4	
HMJ**	SFE-20	8" of #14
HMI	SFE-14	
HMH	SFE-9	
HME	SFE-7 1/2	
HMG	SFE-6	
HMF	SFE-4	

*Also available as in-line fuseholder only with lead wire contacts, HRJ-Less-Fuse.
 **Also available as in-line fuseholder only with lead wire contacts, HMJ-Less-Fuse.

- HHJ-A For 1/4" x 1 1/4" fuse, no wire or fuse included, accepts #18 - #22 wire.
- HHJ-B For 1/4" x 1 1/4" fuse, no wire or fuse included, accepts #12 - #16 wire.
- HHI-A For 1/4" x 1 to 1 1/4" fuse, no wire or fuse included, accepts #18 - #22 wire.
- HHI-B For 1/4" x 1 to 1 1/4" fuse, no wire or fuse included, accepts #12 - #16 wire.
- HIF-A For 1/4" x 5/8" fuse, no wire or fuse included, accepts #18 - #22 wire.

Dimensional Data

All dimensions (±0.015)



BIF document: 2122



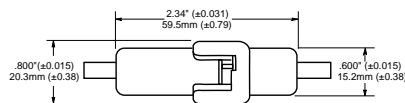
HFA Series
In-Line Waterproof Fuseholders
for 1/4" x 1 1/4" Fuses

Construction:
 Body – Phenolic
 Contacts – Copper crimp leads
Ratings: 250 VAC, 20A
Agency Approvals:
 UL Recognized, Guide IZLT2,
 File E14853
 UL Flammability Rating: 94VO

Electrical Ratings

Catalog Symbol	Amps	VAC	Terminals
HFA	20	250	Crimp #12-#16
HFA-HH	20	250	1/4" Q.C.

Dimensional Data



CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

BIF document: 2115



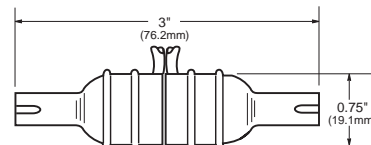
HFB
Waterproof In-Line Fuseholder
for 1/4" x 1 1/4" Fuses

Ratings: 32 VAC, 30A
Construction:
 Body – Thermoplastic rubber
 Contacts – Albaloy-plated copper

Catalog Numbers

Description	Catalog Number
Standard Pack (10-in)	HFB
Bulk Pack (20-in)	BK/HFB
Replacement Contact Clip	BK/1A2294
Accepts #10 Wire	BK/HFB-10

Dimensional Data



- Ideal for harsh environments:
 - -40° to 150° temp. range
 - Withstands many organic solvents and rigorous shock and vibration.
- Accepts #12 to #18 wire leads (not provided).
- Simple assembly.
- One-piece molded thermoplastic.
- High visibility yellow color for easy identification in dark or hard-to-access locations.
- Important information molded into body.

BIF document: 2102



13/32" Diameter

Single Pole

Type SC Fuses



HEG Series
In-Line Fuseholders
Water Resistant, Single-Pole
Ratings: 300 VAC, 15A
Non-Breakaway Holders
 For SC Fuses 0 to 15A, 480 VAC (or less). Fuse size 13/32" x 15/16".

BIF document: 2124



HEH Series
In-Line Fuseholders
Water Resistant, Single-Pole
Non-Breakaway Holders
Ratings: 480 VAC, 20A
Agency Approvals:
 CSA Certified, Class 6225-01, File 47235
 For Type SC-20 Fuses; 20A, 480 VAC (or less). Also fuse types BBS & KTQ (nominal size 13/32" x 15/16").

BIF document: 2124



HEC Series
In-Line Fuseholders
Single-Pole
Ratings: 480 VAC, 30A
 For SC-25, & SC-30 Fuses
 Fuse size 13/32" x 15/16".

BIF document: 2124



HEJ Series
In-Line Fuseholders
Single-Pole
Non-Breakaway Holders
Ratings: 480 VAC, 60A
Agency Approvals:
 UL Recognized, Guide IZLT2, File E14853
 For SC Fuses; 35A to 60A and high voltage fuses. Type HWV, 1/2 to 6A, 1200 VAC (or less). Fuse size 13/32" x 21/4".

BIF document: 2123

Single Pole

13/32" x 1 1/2" Fuses



HEB Series
In-Line Fuseholders
Single-Pole
Ratings: 600 VAC, 30A
Agency Approvals:
 UL Recognized, Guide IZLT2, File E14853 (HEB-AA and HEB-AW-RLC-A)
 CSA Certified, Class 6225-01, File 47235
 For any 13/32" x 1 1/2" fuse. Typical fuse types: BAF, FNM, FNQ, and KTK (1/10 - 30A).

BIF document: 2127



HET Series
In-Line Fuseholders
Single-Pole
 An HEB - Fuseholder with a permanently installed solid neutral. Easily identified by white plastic coupling nut.

BIF document: 2125

Double Pole

KTK-R Fuses



HEY Series
In-Line Fuseholders
Double-Pole
Ratings: 600 VAC, 30A
 Optional Break-away receptacle, water-resistant, polarized, and accepting Class CC branch circuit fuses (Buss type KTK-R, FNQ-R & LP-CC; 600 VAC or less, 200,000A interrupting rating).

BIF document: 2126

13/32" x 1 1/2" Fuses



HEX Series
In-Line Fuseholders
Double-Pole
Ratings: 600 VAC, 30A
Agency Approvals:
 CSA Certified, Class 6225-01, File 47235
 For any 13/32" x 1 1/2" fuse. Typical fuse types: BAF, FNM, FNQ, and KTK (1/10 - 30A).

BIF document: 2126



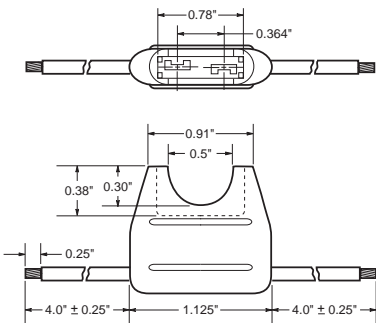
Automotive Blade-Type



HHC and HHD
In-Line Fuseholders for
ATC® Blade-Type Fuses
Ratings: 32 VDC, 3-30A

Electrical Ratings

Catalog Symbol	Description	Fuse Size	Electrical Connection
HHC	Yellow Fuseholder	3-20 Amps	#16 leadwire, black wire
HHF	Fuseholder w/cover		
HHD	Black Fuseholder	3-30 Amps	#12 leadwire, yellow wire
HHG	Fuseholder w/cover		
HHD-C	Cover only		



BIF document: 2107



HHL and HHM
In-Line Fuseholders for
MINI®-Fuses
Ratings: 32 VDC, 30A

Electrical Ratings

Catalog Symbol	Description	Fuse Size	Electrical Connection
HHL	Fuseholder w/cover	2-20 Amps	#16 leadwire, 4" length
HHL-B	Body only		
HHM	Fuseholder w/cover	2-30 Amps	#12 leadwire, 4" length
HHM-B	Body only		
HHM-C	Cover only		

BIF document: 2128



HHX
In-Line Fuseholders for
MAXI™-Fuses
Ratings: 32 VDC, 60A

Electrical Ratings

Catalog Symbol	Description	Fuse Size	Electrical Connection
HHX	Fuseholder w/cover	20-60 Amps	#6 leadwire, 5" length
HHX-B	Body only		
HHX-C	Cover only		

BIF document: 2129



1/4" Diameter



Series 8000

Bolt-in and Snap-in Mounting for 1/4" x 1/4" Fuses

Construction: Blocks are molded flame retarded thermoplastic. Clips are spring-bronze.

Ratings: 300 VAC

Agency Approvals:

UL Recognized under Components Program; File E14853A, Guide IZLT2

CSA Certified Class 6225-01, File 47235

Anti-Rotation Pin: Single pole blocks may be ordered without the antirotational pin simply by adding an "X" to the number of poles (Example: BK/S-8000-1X).

Carton Quantity: 10; shelf package: 100.

Bulk Carton: Single-pole and 2-pole fuse blocks—1,000; Multiple-pole fuse blocks—3-8 pole: 200; 9-12 pole: 50. When ordering bulk quantities, prefix "BK/" to catalog number: (Example: BK/S-8001-1-SNP).

Bolt-in Mounting

Series	Terminal	Angle	Basic Cat. No.	Amperes	Poles (Suffix)
8000	Solder	0° 40°	S-8001- S-8002-	UL 25A CSA 21A	1 - 12
8100	3/16" Quick Connect	0° 40°	S-8101- S-8102-	UL 20A CSA 16A	
8200	1/4" Quick Connect	0° 40° Side	S-8201- S-8202- S-8203-	UL 20A CSA 16A	
8300	Screw	—	S-8301-	UL 30A CSA 10A	

Snap-in Mounting

Series	Terminal	Angle	Cat. No.	Amperes	Poles (Suffix)
8000	Solder	0° 40°	S-8001-1-SNP S-8002-1-SNP	UL 25A CSA 21A	Available only in single pole
8100	3/16" Quick Connect	0° 40°	S-8101-1-SNP S-8102-1-SNP	UL 20A CSA 16A	
8200	1/4" Quick Connect	0° Side	S-8201-1-SNP S-8203-1-SNP	UL 20A CSA 16A	

Catalog Code

BK/	S-8	0	00	-00
Prefix for Bulk Packaging	Series 8000 Product Line	Type Terminal	Terminal Angle	Number of Poles (01-12)
		"0"-Solder; "1"-3/16" Quick Connect; "2"-1/4" Quick Connect; "3"-Screw	"01"-straight (0°); "02"-40; "03"-side*	

* Available only in a single pole



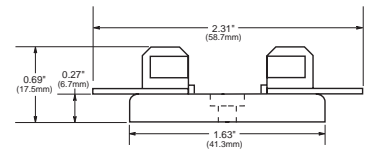
4405

4406

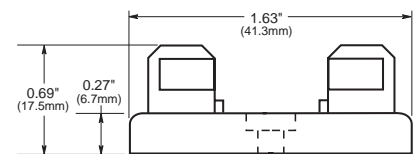
1/4" x 1/4" Single Pole (6.4mm x 31.8mm)

Bakelite base; spring-bronze, Albaloy-plate clips; 30 amperes, 250 VAC; base width 1/2" (12.7mm).

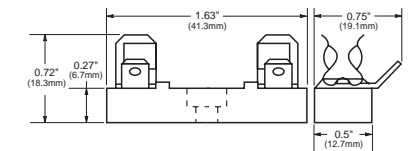
No. 4405—0° Solder Terminals. Integral terminal and clip.



No. 4406—Side Solder Terminal
No. 4574—Spare Fuseblock



No. 2499—Side Quick-Connect Terminals. 1/4" (6.4mm); 15 amperes, 250 VAC. U.L. Recognized, Guide IZLT2, File E14853.



Note—Mounting screw hole diameter is 0.147" (3.7mm). Counterbore diameter, 0.314" (8.0mm). Max. Mounting Screw No. 6.



2499

4574

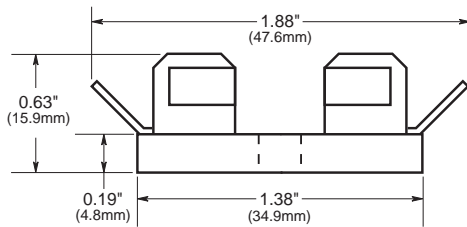


1/4" Diameter



Series 3828

Solder Terminals Fuseblock for 1/4" x 1" Fuses
(6.4mm x 25.4mm)



Catalog And Dimensional Data

Catalog Number	No. of Poles	*Base Length	
		inches	mm
3828-1	1	1/2	12.7
3828-2	2	1 1/8	28.6
3828-3	3	1 3/4	44.5
3828-4	4	2 1/4	60.3
3828-5	5	3	76.2
3828-6	6	3 3/8	92.1
3828-7	7	4 1/4	108.0
3828-8	8	4 7/8	123.8
3828-10	10	6 1/8	155.6
3828-12	12	7 3/8	187.3

*Small phenolic base, base width 1 1/8" (34.9mm)

Note—Mounting screw hole diameter is 0.147" (3.7mm) Max. Mounting Screw No. 6.

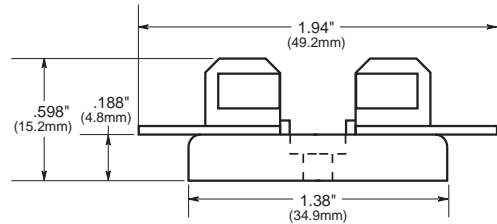


4520 and 4393

Single Pole Fuseblock for 1/4" x 1" Fuses

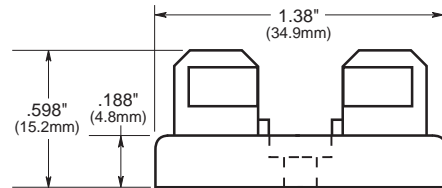
Bakelite base; Width 1/2" (12.7mm). Spring-bronze, Albaloy-plated clips. Rated 30 amperes, 250 VAC.

No. 4520—Solder terminals; straight; integral clip and terminal.



No. 4393—Spare fuseblock.

Note—Mounting screw hole diameter is 0.147" (3.7mm), counterbore 0.314" (8.0mm) diameter. Max. Mounting Screw No. 6.



1 3/32" Diameter



BC Series

Class CC Fuseblocks

For use with Class CC Fuses (Bussmann LP-CC, KTK-R, and FRQ-R)

Construction:

Base - Thermoplastic
Clips - Bright tin-plated bronze

Ratings: 600 VAC, 1/10-30 A

Agency Approvals:

UL Listed, UL 512, Guide IZLT, File E14853
CSA Certified, C22.2 No. 39, Class 6225-01, File 47235
UL Flammability: 94VO

Catalog Data

Amps	Poles	Terminal Type				
		Screw with Quick Connect	Screw with Pressure Plate	Pressure Plate w/ Quick Connect	Box Lug	Box Lug w/Clip
1/10	1	BC6031S	BC6031SQ	BC6031P	BC6031PQ	BC6031B
	2	BC6032S	BC6032SQ	BC6032P	BC6032PQ	BC6032B
30	3	BC6033S	BC6033SQ	BC6033P	BC6033PQ	BC6033B

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



BM Series

Type M Fuseblocks

For use with any 1 3/32" x 1 1/2" Fuses (Bussmann KTK, FNQ, FNM, BAF, BAN, and AGU)

Construction: Thermoplastic

Ratings: 600 VAC, 1/10-30 A

Agency Approvals:

UL Recognized, UL 512, Guide IZLT2, File E14853
CSA Certified, C22.2 No. 39, Class 6225-01, File 47235
UL Flammability: 94VO

Catalog Data

Amps	Poles	Terminal Type		
		Screw with Quick Connect	Pressure Plate w/ Quick Connect	Box Lug
1/10	1	BM6031SQ	BM6031PQ	BM6031B
	2	BM6032SQ	BM6032PQ	BM6032B
30	3	BM6033SQ	BM6033PQ	BM6033B

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



BG Series and G Series

Class G Fuseblocks

For use with Class G Fuses (Bussmann SC)

Construction: (0-30) Thermoplastic
(35-60) Phenolic

Ratings: 480 VAC or less, 0-60 A

Agency Approvals:

1-30A, UL Recognized, UL 512, Guide IZLT2, File E14853
35-60A, UL Listed, UL 512, Guide IZLT, File E14853
CSA Certified, C22.2 No. 39, Class 6225-01, File 47235

Catalog Data

Amps	Poles	Terminal Type			
		Screw with Quick Connect	Pressure Plate w/ Quick Connect	Box Lug	Box Lug w/Clip
1	1	BG3011SQ	BG3011PQ	BG3011B	—
	2	BG3012SQ	BG3012PQ	BG3012B	—
15	3	BG3013SQ	BG3013PQ	BG3013B	—
	1	BG3021SQ	BG3021PQ	BG3021B	—
20	2	BG3022SQ	BG3022PQ	BG3022B	—
	3	BG3023SQ	BG3023PQ	BG3023B	—
25	1	BG3031S	BG3031P	BG3031B	—
	2	BG3032S	BG3032P	BG3032B	—
30	3	BG3033S	BG3033P	BG3033B	—
35	1	—	—	—	G30060-1CR
	2	—	—	—	G30060-2CR
60	3	—	—	—	G30060-3C G30060-3CR

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



13/32" Diameter



3743

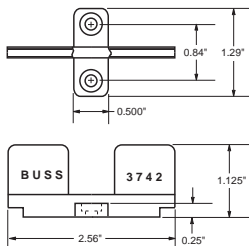
Add-on Fuseblocks for 13/32" x 1 1/2" (10.3mm x 38.1mm) Fuses

UL Recognized Guide IZLT2, File E14853

No. 3743—Block with One Pole. Single pole blocks lock into each other and can be added at any time. Each has a single end barrier. Molded phenolic base; screw terminal; beryllium copper, bright-dipped clips. Rated 30 amps, 600 VAC.

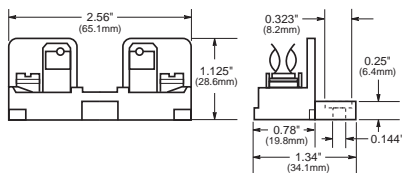


No. 3742—End Barrier Only.



CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

No. 3723—Marking Strip. Length is 9 3/8" (23.8cm). Block and end barrier.



Note—Mounting screw hole diameter is 0.147" (3.7mm). Counterbore diameter, 0.314" (8.0mm) Max. Mounting Screw No. 6.

BIF document: 2104



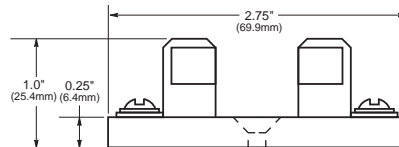
3835

Series Multiple Pole Fuseblocks for 13/32" x 1 1/2" (10.3mm x 38.1mm) Fuses

Silver-plated, beryllium copper clips. Rated 30 amperes, 250 VAC. No side barriers. Screw terminals. Phenolic base.

Cat. No.	No of Poles	Base Length	
		Inches	mm
3835-1	1	27/32"	21.4
3835-2	2	1 1/16"	46.0
3835-3	3	2 25/32"	70.6
3835-4	4	3 3/4"	95.2
3835-5	5	4 23/32"	119.9
3835-6	6	5 11/16"	144.5
3835-7	7	6 2 1/2"	169.0
3835-8	8	7 5/8"	193.7
3835-9	9	8 9/16"	218.8
3835-10	10	9 9/16"	242.9
3835-12	12	11 1/2"	292.1

*Base width—2 3/4" (69.9mm)



Note—Mounting screw hole diameter is 0.148" (3.7mm). Countersink, 0.313" (7.9mm). Max. Mounting Screw No. 6.

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

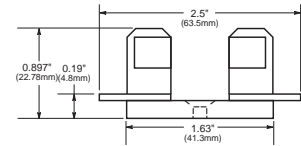
BIF document: 2052



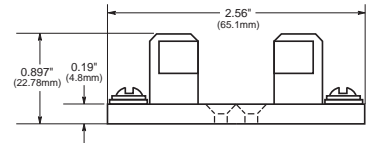
4421 and 4515

Single Pole Fuseblocks for 13/32" x 1 1/2" (10.3mm x 38.1mm) Fuses

No. 4421—Solder Terminals. Base width 5/8" (15.9mm).



No. 4515—Screw Terminals. Base width 3/4" (19mm).



Note—Mounting screw hole diameter is 0.147" (3.7mm). Countersink, 0.312" (7.9mm). Max. Mounting Screw No. 6.

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

BIF document: 2053



5mm Diameter

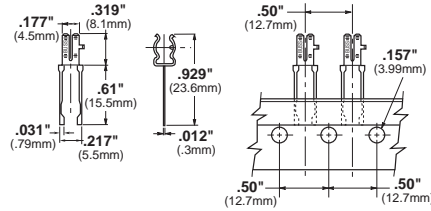
HTC-200M

PC Board Mount Fuseclip

Construction: Tin-plated bronze

Tape and Fanfold packed

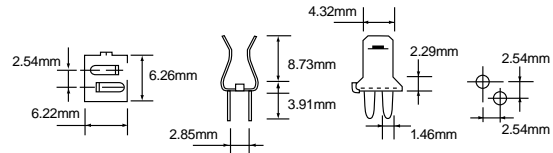
Ammo Pack (HTC-200M) 1000 pieces per box



BIF document: 2110

HTC-210M

PC Board Mounted Fuseclip with End Stops



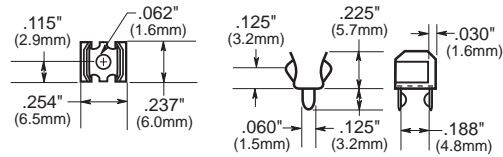
BIF document: 2110

1A3399 Series

Fuseclips with End Stops and Straight Leads

Catalog Number	Clip Material*	Finish
1A3399-01	Beryllium Copper*	Silver
1A3399-04	Beryllium Copper*	Bright Tin
1A3399-10	Spring Bronze	Bright Tin

*Beryllium copper recommended for currents higher than 15 amps (1/4" clips).



BIF document: 2131

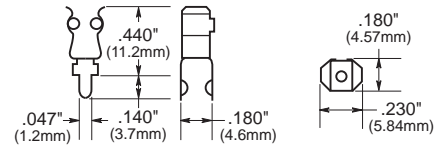
1A5018 Series

Fuseclips with End Stops and Straight Leads

HIGH PROFILE

Catalog Number	Clip Material*	Finish
1A5018-7	Spring Bronze	Silver
1A5018-10	Spring Bronze	Bright Tin

*Beryllium copper recommended for currents higher than 15 amps (1/4" clips).

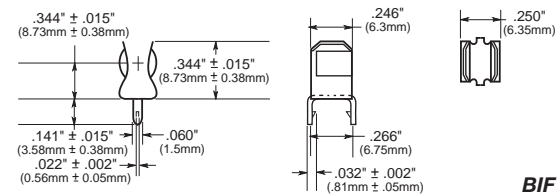


BIF document: 2131

1A5601 Series

Fuseclips (0-7 amps)

Catalog Number	Clip Material	Finish
1A5601	Brass	Bright Tin

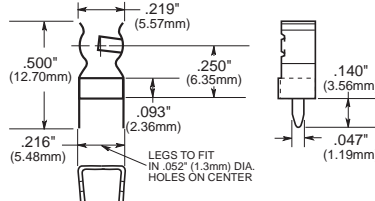


BIF document: 2131

1A5602 Series

Fuseclips (0-7 amps)

Catalog Number	Clip Material	Finish
1A5602	Brass	Bright Tin



BIF document: 2131

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.



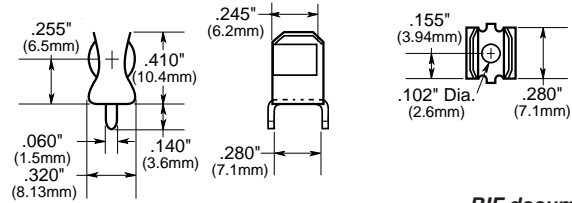
1/4" Diameter

1A3398 Series

Fuseclips without End Stops and Straight Leads

Catalog Number	Clip Material*	Finish
1A3398-07	Spring Bronze	Bright Tin

*Beryllium copper recommended for currents higher than 15 amps (1/4" clips).



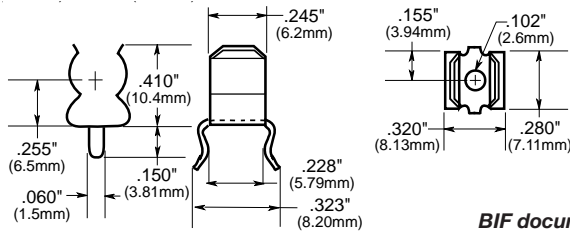
BIF document: 2131

1A4533 Series

Fuseclips without End Stops and Angled Out Leads

Catalog Number	Clip Material*	Finish
1A4533-01	Beryllium Copper*	Bright Tin
1A4533-06	Spring Bronze	Bright Tin

*Beryllium copper recommended for currents higher than 15 amps (1/4" clips).



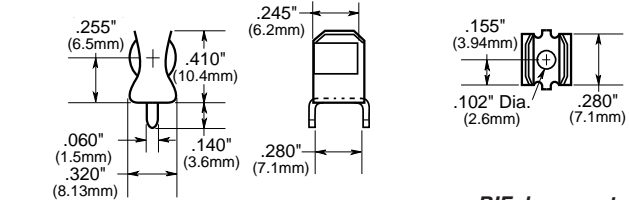
BIF document: 2131

1A1907 Series

Fuseclips with End Stops and Straight Leads

Catalog Number	Clip Material*	Finish
1A1907-02	Spring Bronze	None/Bright Dipped
1A1907-03	Beryllium Copper*	Bright Tin
1A1907-05	Beryllium Copper*	Silver
1A1907-06	Spring Bronze	Bright Tin

*Beryllium copper recommended for currents higher than 15 amps (1/4" clips).



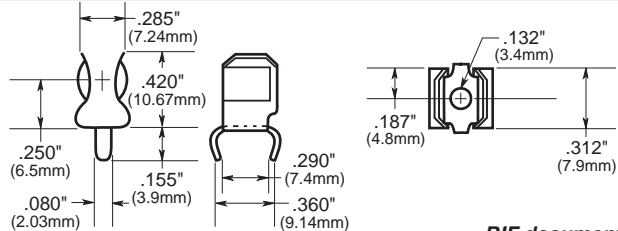
BIF document: 2131

1A1119 Series

Fuseclips with End Stops and Angled In Leads

Catalog Number	Clip Material*	Finish
1A1119-04	Beryllium Copper*	Bright Tin
1A1119-05	Beryllium Copper*	Silver
1A1119-10	Spring Bronze	Bright Tin

*Beryllium copper recommended for currents higher than 15 amps (1/4" clips).



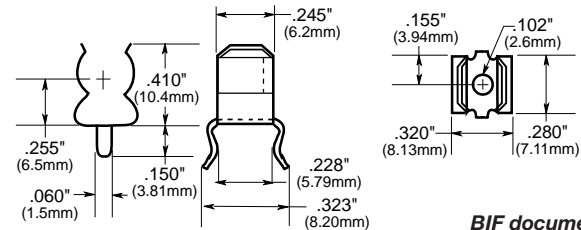
BIF document: 2131

1A4534 Series

Fuseclips with End Stops and Angled Out Leads

Catalog Number	Clip Material*	Finish
1A4534-01	Beryllium Copper*	Bright Tin
1A4534-06	Spring Bronze	Bright Tin

*Beryllium copper recommended for currents higher than 15 amps (1/4" clips).



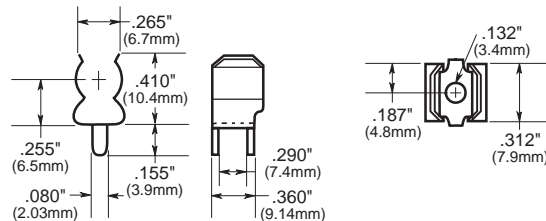
BIF document: 2131

1A1120 Series

Fuseclips without End Stops and Angled In Leads

Catalog Number	Clip Material*	Finish
1A1120-02	Spring Bronze	None/Bright Dipped
1A1120-05	Beryllium Copper*	Silver
1A1120-06	Beryllium Copper*	Bright Tin
1A1120-09	Spring Bronze	Bright Tin

*Beryllium copper recommended for currents higher than 15 amps (1/4" clips).



BIF document: 2131



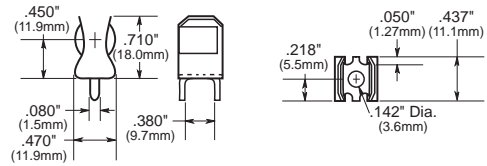
13/32" Diameter and Automotive Blade-Type

1A3400 Series

Fuseclips for 13/32" diameter fuses with End Stops and Straight Leads

Catalog Number	Clip Material	Finish
1A3400-09	Spring Bronze	Bright Tin

20 Amps Maximum

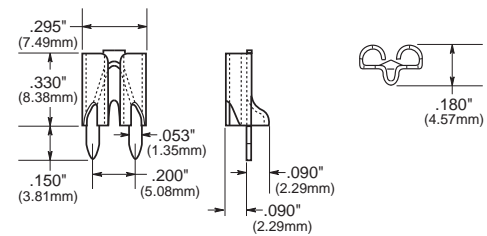


BIF document: 2131

1A5600 Series

Fuseclips for ATC® Fuses (0-20 Amps)

Catalog Number	Clip Material	Finish
1A5600	Brass	Satin Finish Tin



BIF document: 2131

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Various Diameter Fuseclips with Mounting Holes

5681 & 5682 Series

Fuseclips with Mounting Holes For 1/4" Diameter Fuses

Catalog Number	End Stop	Clip Mat.**	Finish	Dimensions (Inches)					Fig. Ref.
				B (To End Stop)	C (Contact)	D (Height)	E (Width)	Hole Dia.	
5681-01	No	BeCu	Silver	.140	.265	.410	.320	.132	2
5681-08		Spg. Br.	Nickel						
5681-15		Spg. Br.	Bright Tin						
5682-01	Yes	BeCu	Silver	.130	.260	.410	.320	.132	1
5682-02		BeCu	Silver						
5682-10		BeCu	Bright Tin						
5682-41		Spg. Br.	Bright Tin						
5682-44		Spg. Br.	Bright Tin	.130					

BIF document: 2132

5672 & 5674 Series

Fuseclips with Mounting Holes For 3/32" Diameter Fuses

Catalog Number	End Stop	Clip Mat.**	Finish	Dimensions (Inches)					Fig. Ref.
				B (To End Stop)	C (Contact)	D (Height)	E (Width)	Hole Dia.	
5672-11	No	Spg. Br.	Bright Tin	†	.362	.520	.380	.172	2
5674-01	Yes	BeCu	Silver	.168	.356	.520	.380	.172	1
5674-10		BeCu	Albaloy						
5674-41		Spg. Br.	Bright Tin						

BIF document: 2132

5956 & 5960 Series

Fuseclips with Mounting Holes For 13/32" Diameter Fuses

Catalog Number	End Stop	Clip Mat.**	Finish	Dimensions (Inches)					Fig. Ref.
				B (To End Stop)	C (Contact)	D (Height)	E (Width)	Hole Dia.	
5956-16	No	Spg. Br.	Bright Tin	—	.307	.710	.470	.172	2
5960-07		BeCu	Silver	.168	.383	.710	.470	.196	1
5960-09		BeCu	Silver	.200				.172	
5960-23		BeCu	Albaloy	.168				.196	
5960-44		Spg. Br.	Nickel	.200				.197	
5960-51	Yes	Spg. Br.	Bright Dip*	.168	.383	.710	.470	.196	1
5960-53	Spg. Br.	Bright Dip*	.200	.172					
5960-61		Spg. Br.	Bright Tin	.168	.383	.710	.470	.196	1
5960-62	Spg. Br.	Bright Tin	.168	.132					
5960-63	Spg. Br.	Bright Tin	.200	.172					
5960-64	Spg. Br.	Bright Tin	.200	.128					

BIF document: 2132

5591 & 5592 Series

Fuseclips with Mounting Holes For 9/16" Diameter Fuses

Catalog Number	End Stop	Clip Mat.**	Finish	Dimensions (Inches)					Fig. Ref.
				B (To End Stop)	C (Contact)	D (Height)	E (Width)	Hole Dia.	
5591-42	Yes	Spg. Br.	Bright Dip	.250*	.513	.891	.594	.172	1
5592-01	No	BeCu	Silver	†	.505	.875	.600	.200	2
5592-11		Spg. Br.	Silver					.200	
5592-33		Spg. Br.	Bright Dip					.172	

BIF document: 2132

* Bright Dip is treated bare metal with no plating.
 ** Spg. Br. — Spring Bronze; BeCu — Beryllium Copper.
 † Hole in center of both clip and contact area.

CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

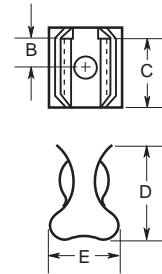


FIGURE 1

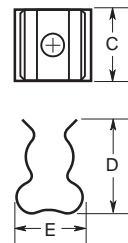


FIGURE 2





Color Coding of Fuses

Color coding is available on both glass and ceramic tube fuses. The Buss color coding process employs a durable exteriorly-applied oven-baked paint that withstands the abrasive action of our customer's vibratory bowl feeders. Color coding is an automated process which results in an economical product, a production lead time of only four weeks, and minimum order quantity of only 1000 pieces. It is available on 1/4" diameter fuses with lengths of 3/4", 7/8", 1", and 1 1/4" (consult factory relative to 1/4" x 5/8" fuses).

Ordering Information—Catalog Numbering System

BK/			
Buss Cat. Symbol (i.e. AGC)	Ampere Rating	Color Coding	
		B—black E—blue (light) N—brown G—gold A—gray D—green (dark) L—green (light) O—orange	K—pink P—purple R—red S—silver T—tan V—violet W—white Y—yellow X—(no stripe)

Examples (2 Amp, AGC Fuse, Bulk-Packed):

- a) With one white stripe—**BK/AGC-2WX**
- b) With two white stripes—**BK/AGC-2WW**
- c) With one white stripe and one gold stripe—**BK/AGC-2WG**

Board Washable Fuses

Bussmann's new board washable fuse line can withstand typical board washing processes; costly off line assembly can thus be eliminated. Standard glass tube fuses cannot necessarily withstand typical aqueous wash and vapor degreasing board cleaning processes. Typically, glass tube fuses are not sealed and can partially fill with water or vapor. To avoid this problem, either Bussmann's new board washable fuses should be utilized or, if standard glass tube fuses are used, a "dummy fuse" should be installed and sent through the solder bath and board washing before being replaced by a functional fuse for shipment.

Note—Board washable fuses are intended for use only in board washing applications. They are not intended to be used in flammable environments or where they may be subjected to frequent exposure to moisture.

Ordering Data—Catalog Numbering System

/	—		
Packaging	Part Family	Boardwashable Leave Blank—	Amp Rating
BK/ — Bulk (100-in) 1/4" x 1 1/4" Fuse standard and axial leads; TP/ — Tray Pack (50- in) 1/4" x 1 1/4" Fuse available only in fuse/clip assembly (with 1A4534-06 Fuse Clips)	AGC — 1/4" x 1 1/4" fast acting, standard configuration. 1/200 amp-7 1/2 amp. AGC-V — 1/4" x 1 1/4" fast acting with axial leads. 1/200 amp-7 1/2 amp. <i>Not available in TP/ Tray packs.</i> MDL — 1/4" x 1 1/4" time delay, standard configuration. 1/200 amp-7 amp. MDL-V — 1/4" x 1 1/4" time delay, with axial leads. 1/200 amp-7 amp. <i>Not available in TP/ Tray packs.</i>	Standard B —Boardwashable Option (Must be specified when ordering TP/)	

Basic Fuse Technology

Fuses serve two main purposes:

- To protect components and equipment from costly damage caused by overcurrents.
- To isolate sub-systems from the main system once a fault has occurred.

Overcurrents

Overcurrents exist when the normal load for a circuit is exceeded. It can be either an overload or short circuit. An overload is any current flowing within the normal circuit path that is higher than the circuit normal full load current.

A short circuit is an overcurrent which greatly exceeds the normal full load current of the circuit. Also, as the name infers, a short circuit leaves the normal current carrying path of the circuit and takes a "short-cut" around the load and back to the power source. Components and equipment can be damaged by both types of overcurrent.

Selecting Overcurrent Protection

During normal conditions, the fuse must carry the load current of the circuit without nuisance openings. However, when an overcurrent occurs the fuse must interrupt the overcurrent, and withstand the voltage across the fuse after arcing. To properly select a fuse the following items must be considered:

- Voltage rating (AC or DC voltage)
- Full load currents (RMS Amperes)
- Available short circuit current
- In-rush characteristics
- Characteristics of equipment or components to be protected
- Ambient conditions
- Standards requirements

In addition, consideration must be given to:

- Available board space
- Type of mounting
- Automatic or manual insertion
- Reliability
- Ease of field service

Electronic circuits frequently exhibit surges, caused by capacitors charging, motors being momentarily stalled, or high voltage components sparking over. It is important that designers take account of these temporary conditions during fuse selection. The ability to resist surges is a function of the fuse design relative to the surge pulse, duration, frequency, etc. Comparison of a manufacturer's I²t value alone is not sufficient, and Bussmann would be pleased to advise on specific applications.

Voltage Ratings

The voltage rating of the fuse must be greater than or equal to the circuit voltage. Because the fuse has such low resistance, the voltage rating becomes critical only when the fuse is trying to open. The fuse must be able to open quickly, extinguish the arc after the fuse element has melted and prevent the system open-circuit voltage from restriking across the open fuse element.

Current Ratings

Each fuse is marked with a nominal current rating.

Several factors can actually affect the ability of the fuse to carry this rated current. First the base material of the clip in which the fuse is mounted may greatly affect the performance of the fuse.

Another important factor is the conductor size used to connect the fuse to other circuit components. If the conductor is too small, it will generate a heat rise. That extra heat will be seen by the fuse, causing the fuse to open before it should. It is also important that the fuse be installed with clean and tight connections. If the connections are dirty or loose, they will cause increased resistance, generating extra heat. That heat will lead to a shortened fuse life.

Interrupting Rating (Breaking Capacity)

A fuse must be able to open the circuit under a short circuit without losing case integrity. The breaking capacity of a protective device is the maximum available current, at the rated voltage, that the device can safely open without rupturing.

Fuse Resistance

In most applications, the voltage drop across the fuse due to its internal and contact resistances is negligible. There are, however, certain critical applications where the fuse resistance must be considered, and it is important that the circuit designer understands the fuse characteristics in order to select the proper fuse.

Physical Sizes

There are numerous physical sizes of electronic small dimension fuses, including sub-miniature fuses. The most common are 5mm x 20mm and 1/4" x 1 1/4" (6.3mm x 32mm).

Sub-miniature fuses are designed for applications where board footprint usage is of critical concern.

Physical Sizes Of Fuses

5mm x 20mm	.2" x .79"
1AG*	1/4" x 5/8"
2AG (5mm x 15mm)	.2" x .59"
3AG	1/4" x 1 1/4"
4AG*	9/32" x 1 1/4"
5AG	13/32" x 1 1/2"
7AG*	1/4" x 7/8"
8AG*	1/4" x 1"


*Not popular for new designs

IEC Standards are very different from North American Standards.

International Electrotechnical Commission (IEC) writes the standards followed by many European and Asian countries. Among the commission members are:

Australia	Israel	Romania
Canada	Japan	South Africa
Denmark	Korea	Sweden
Finland	Netherlands	Switzerland
Germany	Norway	Turkey
Great Britain	Poland	U.S.A.
Hungary	Portugal	Yugoslavia

Because the electrical characteristics of these fuses are so different, North American and IEC rated fuses are not interchangeable. When designing products to go "international", it is important to consider that world standards may require different fuses.

Some of these countries conduct their own testing, such as VDE, the German testing agency. However, most accept the testing of Svenska Elektriska Material Kontrollanstalten or Semko, the Swedish testing agency. Those products tested by Semko that pass the IEC requirements are marked with .

The testing by European agencies revolves around voltage drop, time current characteristics, breaking capacity and endurance tests. However, the biggest differences between North American and European standards are the time current characteristics. As shown on the next page, fuses built to North American standards are not compatible with European standards.

IEC Versus North American Standards

Percent Of Fuse Rating		North American Listed or Certified Fuses Miscellaneous and Miniature Types*				International Electrotechnical Commission Fuses (Publication 127)					
		Fast-Acting Fuses		Time-Delay Fuses		Fast-Acting Fuses Sheet 1		Fast-Acting Fuses Sheet 2		Time-Delay Fuses Sheet 3	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
110%	0-30A	Cont.	—	Cont.	—						
135%	0-30A	—	1 hr.	—	1 hr.						
150%	32mA-6.3A	—	—	—	—	1 hr.	—	1 hr.	—	1 hr.	—
200%	0-3.0A	—	2 min.	5 sec.	2 min.						
	3.1-30A	—	2 min.	12 sec.	2 min.						
210%	32mA-6.3A					—	30 min.	—	30 min.	—	2 min.
275%	32mA-3.9A					.01 sec.	2 sec.	—	—	—	—
	4A-6.3A					.01 sec.	3 sec.	—	—	—	—
	32-100mA					—	—	.01 sec.	.5 sec.	.2 sec.	10 sec.
	125mA-6.3A					—	—	.05 sec.	2 sec.	.6 sec.	10 sec.
400%	32-100mA					.003 sec.	.3 sec.	.003 sec.	.1 sec.	.04 sec.	3 sec.
	125mA-6.3A					.003 sec.	.3 sec.	.01 sec.	.3 sec.	.15 sec.	3 sec.
1000%	32-100mA					—	.02 sec.	—	.02 sec.	.01 sec.	.3 sec.
	125mA-6.3A					—	.02 sec.	—	.02 sec.	.02 sec.	.3 sec.

*Does not include micro fuses

Notice that at 135% of its rated current a North American fuse must open within one hour while an IEC fuse must be able to carry 150% of its rated current for at least one hour.

The IEC uses symbols to denote fuse time current characteristics, and breaking capacity.

Characteristics Symbol:

LETTER CODE	COLOR CODE	BREAKING CAPACITY SYMBOL
FF—Super Quick Acting	Black	L: Low Breaking Capacity
F—Quick Acting	Red	35A @ 250 VAC or 10 x Rated Current
M—Medium Time Lag	Yellow	H: High Breaking Capacity
T—Time Lag	Blue	1500A @ 250 VAC
TT—Super Time Lag	Grey	

Typical interrupting ratings of North American "Listed" electronic fuses is 10,000 amperes for all voltage levels except 250 volt fuses. 250 volt listed fuses are first tested as 125 volt fuses, in which case they must have a 10,000 ampere interrupting rating. However, at 250 volts, these fuses, as shown below, may have lower interrupting ratings.

Interrupting Ratings (Breaking Capacity) of North American Listed Fuses

Voltage Rating	Amp Rating of Fuse	Short Circuit Current UL Minimums
125V*	All	10,000A
	0-1A	35A
	1.1-3.5A	100A
250V	3.6-10A	200A
	10.1-15A	750A
	15.1-30	1,500A
300V	All	10,000A
500V	All	10,000A
600V	All	10,000A, 50,000A, or 100,000A

*Does not include micro fuses.

International Electrotechnical Commission (IEC)

Fuses designed to IEC standards must meet a breaking capacity test. The various breaking capacities for the four main IEC fuse types are shown below.

Interrupting Ratings (Breaking Capacity) Per IEC Standards

Type	Case Size	Breaking Capacity
Quick-Acting High-Breaking Capacity	5mm x 20mm	1,500A
Quick-Acting Low-Breaking Capacity	5mm x 20mm	35A or 10 times rated current, whichever is greater.
Time-Lag Low-Breaking Capacity	5mm x 20mm	35A or 10 times rated current, whichever is greater.
Quick-Acting Low-Breaking Capacity	6.3mm x 32mm	35A or 10 times rated current, whichever is greater.

Finally, both North American and IEC fuses' interrupting/breaking capacity are tested using AC. Their DC ratings could be different because of circuit time constant considerations. It is generally easier for a fuse to operate under AC than DC.

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 VAC, 75-1500 VDC). Refer to BIF document #8002 or contact Bussmann Application Engineering at 314-527-1270 for more information.

Ampere

The measurement of intensity of rate of flow of electrons in an electric circuit. An ampere is the amount of current that will flow through a resistance of one ohm under a pressure of one volt.

Ampere Rating

The current carrying capacity of a fuse. When a fuse is subjected to a current above its ampere rating, it will open the circuit after a predetermined period of time.

Ampere Squared Seconds, I²t

The measure of heat energy developed within a circuit during the fuse's clearing. It can be expressed as "melting I²t", "arcing I²t" or the sum of them as "Clearing I²t". "I" stands for effective let-through current (RMS), which is squared, and "t" stands for time of opening, in seconds.

Arcing Time

The amount of time from the instant the fuse link has melted until the overcurrent is interrupted, or cleared.

Breaking Capacity

(See Interrupting Rating)

Cartridge Fuse

A fuse consisting of a current responsive element inside a fuse tube with terminals on both ends.

Class CC Fuses

600V, 200,000 ampere interrupting rating, branch circuit fuses with overall dimensions of $1\frac{3}{32}$ " \times $1\frac{1}{2}$ ". Their design incorporates a rejection feature that allows them to be inserted into rejection fuseholders and fuseblocks that reject all lower voltage, lower interrupting rating $1\frac{3}{32}$ " \times $1\frac{1}{2}$ " fuses. They are available from $\frac{1}{10}$ amp through 30 amps.

Class G Fuses

480V, 100,000 ampere interrupting rating branch circuit fuses that are size rejecting to eliminate overfusing. The fuse diameter is $1\frac{3}{32}$ " while the length varies from $1\frac{1}{16}$ " to $2\frac{1}{4}$ ". These are available in ratings from 1 amp through 60 amps.

Class H Fuses

250V and 600V, 10,000 ampere interrupting rating branch circuit fuses that may be renewable or non-renewable. These are available in ampere ratings of 1 amp through 600 amps.

Class R Fuses

These are high performance fuses rated $\frac{1}{10}$ -600 amps in 250 volt and 600 volt ratings. All are marked "Current Limiting" on their label and have a 200,000 amp interrupting rating. They have identical outline dimensions with the NEC fuses (Class H) but have a rejection feature which prevents the user from mounting a fuse of lesser capabilities (lower interrupting capacity) when used with special Class R clips. Class R fuses will fit into either rejection or non-rejection clips.

Clearing Time

The total time between the beginning of the overcurrent and the final opening of the circuit at rated voltage by an overcurrent protective device. Clearing time is the total of the melting time and the arcing time.

Current Limitation

A fuse operation relating to short circuits only. When a fuse operates in its current limiting range, it will clear a short circuit in less than $\frac{1}{2}$ cycle. Also, it will limit the instantaneous peak let-through current to a value substantially less than that obtainable in the same circuit if that fuse were replaced with a solid conductor of equal impedance.

Dual Element Fuse

Fuse with a special design that utilizes two individual elements in series inside the fuse tube. One element, the spring actuated trigger assembly, operates on overloads up to 5-6 times the fuse current rating. The other element, the short circuit section, operates on short circuits up to their interrupting rating.

Fast Acting Fuse

A fuse which opens on overload and short circuits very quickly. This type of fuse is not designed to withstand temporary overload currents associated with some electrical loads.

Fuse

An overcurrent protective device with a fusible link that operates and opens the circuit on an overcurrent condition.

High Speed Fuses

Fuses with no intentional time-delay in the overload range and designed to open as quickly as possible in the short circuit range. These fuses are often used to protect solid state devices.

Interrupting Capacity

See Interrupting Rating

Interrupting Rating (Breaking Capacity)

The rating which defines a fuse's ability to safely interrupt and clear short circuits. This rating is much greater than the ampere rating of a fuse. The NEC defines Interrupting Rating as, "The highest current at rated voltage that an overcurrent protective device is intended to interrupt under standard test conditions."

Melting Time

The amount of time required to melt the fuse link during a specified overcurrent. (See Arcing Time and Clearing Time.)

Ohm

The unit of measure for electric resistance. An ohm is the amount of resistance that will allow one ampere to flow under a pressure of one volt.

Ohm's Law

The relationship between voltage, current, and resistance, expressed by the equation $E = IR$, where E is the voltage in volts, I is the current in amperes, and R is the resistance in ohms.

Overcurrent

A condition which exists on an electrical circuit when the normal load current is exceeded. Overcurrents take on two separate characteristics—overloads and short circuits.

Overload

Can be classified as an overcurrent which exceeds the normal full load current of a circuit. Also characteristic of this type of overcurrent is that it does not leave the normal current carrying path of the circuit—that is, it flows from the source, through the conductors, through the load, back through the conductors, to the source again.

Peak Let-Through Current, Ip

The instantaneous value of peak current let-through by a current limiting fuse, when it operates in its current limiting range.

Resistive Load

An electrical load which is characteristic of not having any significant inrush current. When a resistive load is energized, the current rises instantly to its steady state value, without first rising to a higher value.

R.M.S. Current

The R.M.S. (root-mean-square) value of any periodic current is equal to the value of the direct current which, flowing through a resistance, produces the same heating effect in the resistance as the periodic current does.

Semiconductor Fuses

Fuses used to protect solid state devices. See "High Speed Fuses".

Short Circuit

Can be classified as an overcurrent which exceeds the normal full load current of a circuit by a factor many times (tens, hundreds or thousands greater). Also characteristic of this type of overcurrent is that it leaves the normal current carrying path of the circuit—it takes a "short cut" around the load and back to the source.

Time-Delay Fuse

A fuse with a built-in delay that allows temporary and harmless inrush currents to pass without opening, but is so designed to open on sustained overloads and short circuits.

Voltage Rating

The maximum open circuit voltage in which a fuse can be used, yet safely interrupt an overcurrent. Exceeding the voltage rating of a fuse impairs its ability to clear an overload or short circuit safely.



Bussmann

Headquarters

Cooper Industries
Bussmann Division
P.O. Box 14460
St. Louis, Missouri 63178-4460, USA
Telephone: 314 394 2877
Facsimile: 800 544 2570

Bussmann Circuit Components

7300 West Wilson Avenue
Chicago, IL 60656-4793, USA
Telephone: 708 867 4600
Facsimile: 708 867 2211

European Headquarters

Bussmann Division
Cooper (U.K.) Limited
Burton-on-the-Wolds
Leicestershire LE12 5th, England
Telephone: 44 1509 882737
Facsimile: 44 1509 882786

Bussmann Asia Pacific

331 North Bridge Road
#03-02 Odeon Towers
Singapore 188720
Telephone: 65 336 3610
Facsimile: 65 336 4810

Bussmann Australia

Dock 5, Block X
391 Park Road
P.O. Box 257
Regents Park, Sydney
NSW 2143, Australia
Telephone: 61 2 9743 8333
Facsimile: 61 2 9743 8070

Bussmann Brazil

Bussmann do Brasil Ltda.
Rodovia Santos Dumont, Km 23
Cruz das Almas
Itu-Sao Paulo 13 300-000
Brazil
Telephone: 55 11 7824 1856
Facsimile: 55 11 7824 1721

Bussmann Denmark

5 Literbuen
DK-2740 Skovlunde
Copenhagen, Denmark
Telephone: 45 4485 0900
Facsimile: 45 4485 0901

Bussmann France

Tour Mattei
207 Rue de Bercy
75587 Paris Cedex 12
France
Telephone: 33 1 4475 0033
Facsimile: 33 1 4475 0420

Bussmann Germany

Frankfurter Landstrasse 19
64546 Mörfelden
Germany
Telephone: 49 6105 951509
Facsimile: 49 6105 951510

Bussmann India

2nd Floor, Unit #5
White House
23-29, St. Marks Road
Bangalore – 560-001
India
Telephone: 91 80 227 0893
Facsimile: 91 80 224 0124

Bussmann Mexico

Arrow-Hart S.A. de C.V.
Poniente 148, No. 933
02300 Mexico, D.F. Mexico
Telephone: 52 5 587 0211
Facsimile: 52 5 567 4049

Bussmann®

Worldwide Circuit Protection Solutions

COOPER INDUSTRIES, BUSSMANN DIVISION • P.O. BOX 14460 • ST. LOUIS, MO 63178-4460 • (314) 394-2877

World Wide Web: www.bussmann.com

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