

Filter Design Criteria

SAE Power Devices Filters

This catalog describes SAE Power's line of electromagnetic interference (EMI) filters. These devices are designed to suppress undesirable electrical impulses or disturbances in power lines. They are used extensively to allow equipment to operate compatibly on a common power source. EMI filters limit the amplitude of interfering voltages on AC power lines and prevent them from propagating into or out of the filtered equipment.

The devices offered in this catalog are designed to satisfy a wide range of mechanical and electrical requirements. This catalog covers general application, high-performance, super-performance, switching transient, three-phase, power entry module and connector series filters. Many filtering needs will be satisfied by the general application series. More stringent requirements may necessitate high performance, super-performance, or switching transient filters. The connector series offers a wide variety of filters with integral power connectors. For extremely low leakage current requirements, the medical series filters are available. Three-phase filters are offered for three-wire delta systems and four-wire wye systems. If you cannot find a filter to meet your particular requirements, contact SAE Power or one of its authorized representatives.

All filters in this catalog are designed to meet UL, CSA, and VDE requirements.

Consult SAE Power or your local sales representative for specific details.

UL standard 1283

CSA standard C22.2 No. 8-M 1986

VDE 0565 Part 3

*Specifications are subject to change without notice for product improvement.

Filtering Conducted EMI

EMI filters are required to reduce interfering signals to or from electronic devices that generate or are susceptible to such signals. Filters are designed to suppress RFI voltages that exist line to line (differential mode) and line to ground (common mode), or both.

Common mode interference is most frequently encountered. These signals are readily propagated in power systems and equipment. Susceptibility problems are generally the result of common mode interference. Some devices, such as SCRs and switching regulators, can cause differential mode interference to nearby susceptible equipment, but this interference is rapidly attenuated in most wiring systems.

VDE: What, Why, Who

VDE (Verband Deutscher Elektrotechniker) is the Association of German Electrical Engineers which is analogous to the American IEEE. Voluntary committees of this group prepare standards or regulations aimed at public safety, product reliability and consumer protection. Resulting VDE regulations are reviewed by the German Standards Institute, DIN, and the German Electrotechnical Commission, DEK. New regulations receive a DIN number bearing the last three digits of the VDE regulation; VDE 0565 Part 3 (Suppression filters to 16 amp) is DIN 57565 Part 3.

One arm of VDE (VDE Pruefstelle) is the VDE testing laboratory. This is a quasi independent organization whose function is verification testing to the DIN regulations. VDE Pruefstelle is contracted by the German Postal Service* (FTZ) to perform all radio interference emissions testing. In this function, VDE is the only laboratory that issues the radio protection mark. For product safety testing, however, other testing laboratories such as TUV Rheinland and TUF can perform the tests to DIN regulations and provide certification thereto. Their product safety certification marks differ in appearance from VDE, but are equally recognized and accepted by Germany.

*The German Postal Service has the responsibility for enforcing the German laws governing radio interference emissions.

Custom Capabilities

Many filter applications arise where standard catalog items will not satisfy the requirements. SAE Power has accommodated many applications with special designs tailored to the customer's specific requirements. Whether the problem is mechanical or electrical, SAE Power's design group can provide the answers. We have designed and constructed filters for high and low voltages and in current ratings up to several hundred amperes. All types of special mechanical configurations and attachment schemes can be provided along with a wide variety of electrical connection arrangements. Much higher performance filters for fixed installations where leakage current is not a consideration can also be designed and fabricated at SAE Power.

Testing facilities to permit custom circuit design to reduce equipment emission levels to various specification limits are also available. For additional information, call your nearest SAE Power representative or distributor to arrange for a consultation with one of our engineering staff for a solution to your special problem.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

How to Select a Filter

Although much has been written about the selection of EMI filters, the actual process is one of trial and error. Fortunately, a wealth of experience is available to aid the designer in selecting an effective filter.

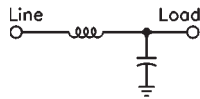
EMI filters work by creating a mismatch condition between source and load impedances at high frequencies. This mismatch is created by series inductance and shunt capacitive elements. Since the filter must usually work with unknown terminating impedances, it is an error to use insertion loss data obtained with fixed 50-ohm terminations as a true indication of filter performance in actual situations.

In most applications, power line impedance is almost always low, but equipment impedance may be low or high, depending upon the device. Switching regulators or power supplies are low-impedance loads, but linear power supplies may be high impedance. To achieve maximum mismatch, the filter must present a high series impedance or inductance to the power line and a low shunt impedance or large capacitance to a high impedance load. If the equipment impedance is low, the filter must also present a high series inductance between line and load. In general, the power source appears as a relatively low impedance.

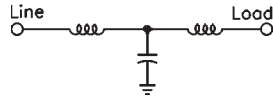
Also to be considered are applicable specifications, such as MIL-STD-461 A, or commercial specifications, such as VDE, UL, IEC, CSA, and BSI. Some of the requirements for these specifications are given in the Glossary of Terms.

Therefore, use the following rules.

1. For high equipment impedance, use: Capacitance to load



2. For low equipment impedance, use: Inductance to load and line



Other filter considerations are:

1. Current and voltage rating.
2. Temperature, shock, vibration, and humidity.
3. Physical dimensions and mounting.
4. Terminal configuration.

Typical Ratings

Temperature rating: -20^o to +45^oC nominal operating to +85^oC with derating.

Humidity test: 21 days at 40^oC and 95% relative humidity.

Test voltage:

Line to ground, 2250 VDC.

Line to line, 1450 VDC.

Current overload test: 140% rating for 15 min or 6X rated for 8 sec.

Voltage drop: Less than 1 % of rated voltage.



G A Series

General Application Filters

Applications

SAE Power's general application filters are available in two circuit configurations to provide an economical solution to the majority of interference problems. All units are recognized under UL 1283 and CSA 22.2 No.8-M1986 and are designed to meet the requirements of VDE or DIN specifications.

Circuit A Filters

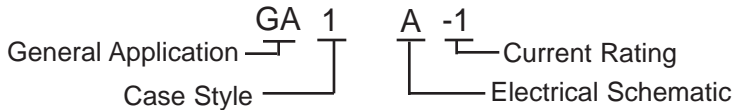
These filters are designed for a wide variety of filtering applications. They offer the lowest cost and smallest package size for effective control of common mode (line-to-ground) interference. They are available in a wide selection of mechanical configurations and current ratings.

Circuit B Filters

These filters are used where differential mode (line-to-line) interference reduction is required as well as common mode rejection. They offer the same wide current rating selection and mechanical versatility as Circuit A filters.

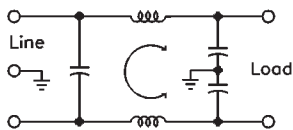


How to Order

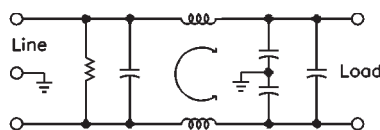


Electrical Schematics

Circuit A Filters



Circuit B Filters



Specifications

- Voltage rating:** 115/250 VAC
- Line frequency:** 50/60 Hz
- Leakage current (line to ground*):**
 0.50 mA maximum at 115 V, 60 Hz
 1.00 mA maximum at 250 V, 50 Hz
- Test voltage:**
 Line to ground, 2250 VDC
 Line to line, 1450 VDC
- Current overload test:**
 6X rated for 8 sec.
- Insulation resistance:**
 6000 megohms at 100 VDC

*Special low-leakage-current models (less than 0.5 mA at 250 VAC, 50 Hz) may be ordered by using the prefix L on part number, e.g., LGA1A-1.

Performance

Current Rating	Frequency, MHz							
	0.15	0.5	1	5	10	20	30	
Common Mode								
1, 2, 3 & 5 amp (A) (B)	15	30	38	50	50	50	50	50 (dB)
10, 20 & 30 amp (A) (B)	6	20	28	42	45	45	45	48 (dB)
Differential Mode								
1, 2, 3 & 5 amp (A)	0.5	3	6	30	50	40	40	40 (dB)
10, 20 & 30 amp (A)	0.5	3	6	30	50	40	40	40 (dB)
1, 2, 3 & 5 amp (B)	2	5	8	40	60	40	40	40 (dB)
10, 20 & 30 amp (B)	10	13	30	50	50	40	40	40 (dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A. Low leakage models are approximately 6 dB lower insertion loss.



These filters are recognized under the components program of Underwriters Laboratories, Inc. and the Canadian Standards Association.

UL File No. E62459 CSA File No. LR49272
 TUV File No. R50154 VDE File No. 51404



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Ordering Information

Circuit A

Part No.	Dimensions, inches/mm				
	A	B	C	D	E
1 amp					
GA1A-1	1.75/44.45	0.88/22.35	0.63/16.00	2.13/54.10	2.50/63.50
GA2A-1	1.75/44.45	0.88/22.35	0.63/16.00	2.13/54.10	2.50/63.50
GA3A-1	1.75/44.45	0.88/22.35	0.63/16.00	2.13/54.10	2.50/63.50
2 amp					
GA1A-2	1.75/44.45	0.88/22.35	0.63/16.00	2.13/54.10	2.50/63.50
GA2A-2	1.75/44.45	0.88/22.35	0.63/16.00	2.13/54.10	2.50/63.50
GA3A-2	1.75/44.45	0.88/22.35	0.63/16.00	2.13/54.10	2.50/63.50
3 amp					
GA1A-3	1.75/44.45	1.25/31.75	0.75/19.05	2.13/54.10	2.50/63.50
GA2A-3	1.75/44.45	1.25/31.75	0.75/19.05	2.13/54.10	2.50/63.50
GA3A-3	1.75/44.45	1.25/31.75	0.75/19.05	2.13/54.10	2.50/63.50
5 amp					
GA1A-5	1.75/44.45	1.25/31.75	0.75/19.05	2.13/54.10	2.50/63.50
GA2A-5	1.75/44.45	1.25/31.75	0.75/19.05	2.13/54.10	2.50/63.50
GA3A-5	1.75/44.45	1.25/31.75	0.75/19.05	2.13/54.10	2.50/63.50
10 amp					
GA1A-10	1.75/44.45	1.25/31.75	1.13/28.70	2.13/54.10	2.50/63.50
GA2A-10	1.75/44.45	1.25/31.75	1.13/28.70	2.13/54.10	2.50/63.50
GA3A-10	1.75/44.45	1.25/31.75	1.13/28.70	2.13/54.10	2.50/63.50
GA6A-10	1.75/44.45	1.25/31.75	1.13/28.70	2.13/54.10	2.50/63.50
20 amp					
GA1A-20	2.00/50.80	2.00/50.80	1.13/28.70	2.38/60.45	2.78/70.61
GA6A-20	2.00/50.80	2.00/50.80	1.13/28.70	2.38/60.45	2.78/70.61
30 amp					
GA5A-30	3.88/98.55	3.31/84.07	1.50/38.10	3.75/95.25	4.13/104.90

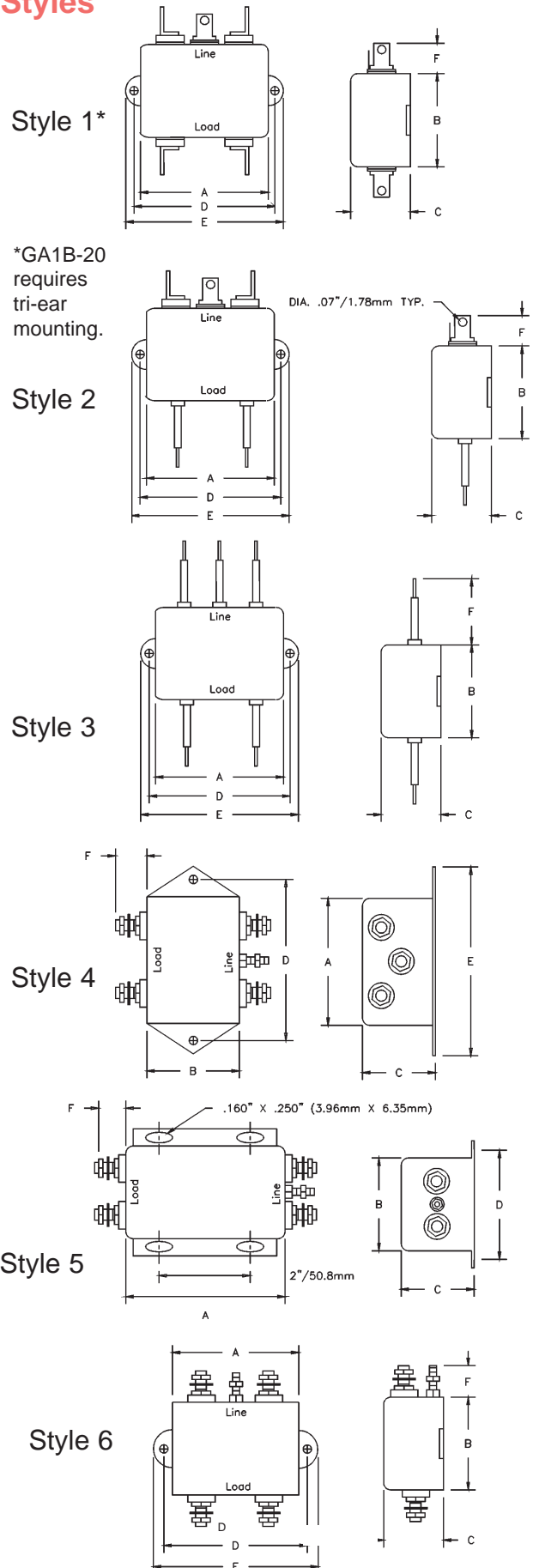
Circuit B

Part No.	Dimensions, inches/mm				
	A	B	C	D	E
1 amp					
GA1B-1L	2.00/50.80	1.75/44.45	0.88/22.35	2.38/60.45	2.78/70.61
GA2B-1L	2.00/50.80	1.75/44.45	0.88/22.35	2.38/60.45	2.78/70.61
GA3B-1L	2.00/50.80	1.75/44.45	0.88/22.35	2.38/60.45	2.78/70.61
2 amp					
GA1B-2L	2.00/50.80	1.75/44.45	0.88/22.35	2.38/60.45	2.78/70.61
GA2B-2L	2.00/50.80	1.75/44.45	0.88/22.35	2.38/60.45	2.78/70.61
GA3B-2L	2.00/50.80	1.75/44.45	0.88/22.35	2.38/60.45	2.78/70.61
3 amp					
GA1B-3L	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.78/70.61
GA2B-3L	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.78/70.61
GA3B-3L	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.78/70.61
5 amp					
GA1B-5L	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.78/70.61
GA2B-5L	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.78/70.61
GA3B-5L	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.78/70.61
10 amp					
GA1B-10	2.00/50.80	2.00/50.80	1.13/28.70	2.38/60.45	2.78/70.61
GA2B-10	2.00/50.80	2.00/50.80	1.13/28.70	2.38/60.45	2.78/70.61
GA3B-10	2.00/50.80	2.00/50.80	1.13/28.70	2.38/60.45	2.78/70.61
GA6B-10	2.00/50.80	2.00/50.80	1.13/28.70	2.38/60.45	2.78/70.61
20 amp					
GA1B-20	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.33
GA4B-20	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.33
30 amp					
GA5B-30	3.88/98.55	3.31/84.07	1.50/38.10	3.75/95.25	4.13/104.90

F Dimensions (typical)

	inches/mm
.250 tab terminals:	.580 max/14.73
18-gauge wire leads:	4.25 min/107.95
threaded terminal:	8-32 x .675 max/26.50
mounting hole:	.188/4.75 (except as noted)

Case Styles



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

©2001 SAE Power Inc.

HPC & C Series

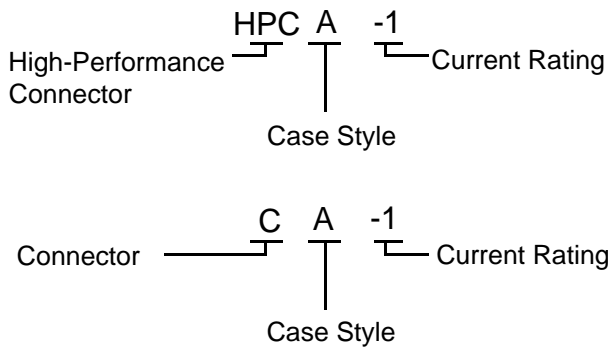
Connector and High-Performance Connector Filters

Applications

The HPC series high-performance connector filters offer higher attenuation in both common and differential modes than the standard C series filters, and are used as a replacement when C series filters do not adequately suppress noise to meet FCC or VDE requirements.

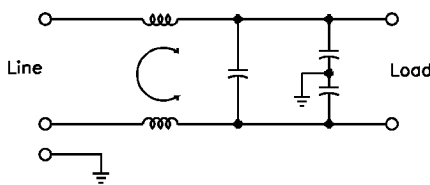
The 1, 3, 6, 10 and 20 ampere C series filters also utilize IEC power connectors. All units provide protection from line-to-line and line-to-ground interference.

How to Order

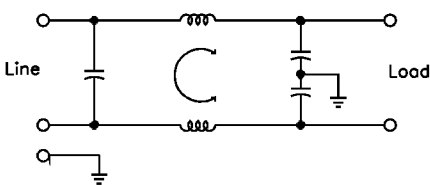


Electrical Schematics

Circuit 1



Circuit 2*



*Circuit 1 is standard for HPC Series.

If circuit 2 is desired, specify on order by adding -2 to the part number, eg. HPCA-10-2.

HPC Series includes Discharge Resistors.

Specifications

Voltage rating: 115 / 250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground):

0.25 mA maximum at 115 VAC, 60 Hz
(circuit 1 or 2, CA, CB, HPCA, HPCB)

0.50 mA maximum at 250 VAC, 50 Hz
(circuit 1 or 2, CA, CB, HPCA, HPCB)

Test voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC



These filters are UL recognized, CSA certified and VDE and TUV approved.
UL File No. E62459. CSA File No. LR49272.
TUV File No. R30001. VDE File No. 51403.
Approvals pending for CA-10, CB-10, CA-20, CB-20.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Performance

Series HPC, Series C

Current Rating

		Frequency, MHz							
		0.15	0.2	0.5	1	5	10	20	30
Common Mode									
1 amp	CA-1, CB-1	22	28	35	40	46	50	50	50 (dB)
	HPCA-1, HPCB-1	24	30	38	42	49	52	55	55 (dB)
3 amp	CA-3, CB-3	15	20	25	30	45	50	55	55 (dB)
	HPCA-3, HPCB-3	20	26	29	36	45	50	55	55 (dB)
6 amp	CA-6, CB-6	9	14	20	25	41	45	50	50 (dB)
	HPCA-6, HPCB-6	14	19	23	30	41	45	50	50 (dB)
10amp	CA-10, CB-10	10	12	18	23	42	40	40	45 (dB)
20amp	CA-20, CB-20	5	8	13	15	23	28	35	43 (dB)
Differential Mode									
1 amp	CA-1, CB-1	0	0	1	4	33	37	37	36 (dB)
	HPCA-1, HPCB-1	3	10	15	20	37	37	37	36 (dB)
3 amp	CA-3, CB-3	0	0	1	3	33	37	37	36 (dB)
	HPCA-3, HPCB-3	3	10	15	20	37	37	37	36 (dB)
6 amp	CA-6, CB-6	0	0	0	1	25	35	35	34 (dB)
	HPCA-6, HPCB-6	3	8	15	20	31	35	35	34 (dB)
10amp	CA-10, CB-10	0	0	2	5	35	40	40	36 (dB)
20amp	CA-20, CB-20	3	8	15	20	45	35	45	55 (dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

Ordering Information

Series C, Series HPC

Part No.	Dimensions, inches/mm				Circuit
	A	B	C	D	
1 amp					
CA-1	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	2
HPCA-1	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	1 or 2
CB-1	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	2
HPCB-1	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	1 or 2
3 amp					
CA-3	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	2
HPCA-3	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	1 or 2
CB-3	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	2
HPCB-3	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	1 or 2
6 amp					
CA-6	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	2
HPCA-6	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	1 or 2
CB-6	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	2
HPCB-6	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00	1 or 2
10amp					
CA-10	2.00/50.80	1.17/29.72	0.81/20.57	1.57/39.88	1
CA-10	2.00/50.80	1.17/29.72	0.81/20.57	1.57/39.88	1
20amp					
CA-20	4.00/101.60	1.40/35.56	1.10/27.94	1.65/41.91	2

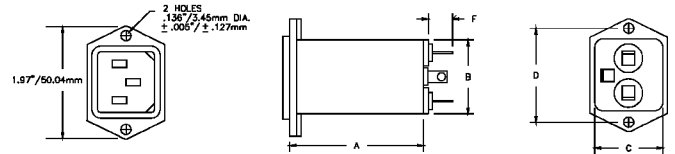
For small solder lug terminations add suffix L; e.g., CA-1L or HPCB-3L.
 For 4 1/4" wire lead outputs, add a W to the end of any part number.
 For other wire lengths, check with the factory.

F Dimensions (typical)

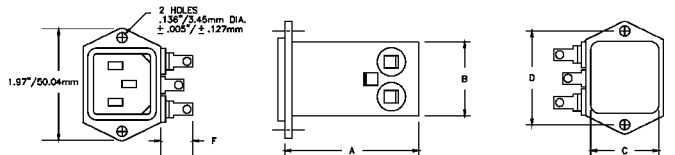
	inches/mm
.250 tab terminals:	.580 max/14.73
solder lug terminals:	.450 max/1.43
solder lug hole diameter:	.078/1.98

Case Styles

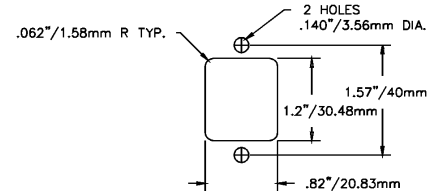
Style A



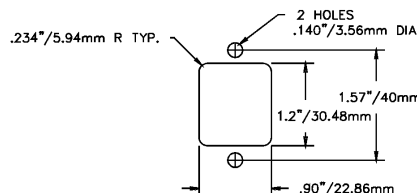
Style B



Panel Cutout (Front Mounting) Typical



Panel Cutout (Back Mounting) Typical



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

SPC Series

Super-Performance Connector Filters

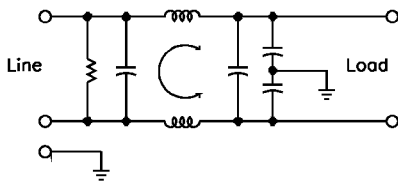
Applications

The SPC series super-performance power line filters give extremely high attenuation of both common and differential mode signals. These filters are an extension of the HPC series high-performance connector filters, having the same circuit with line-to-line capacitors on both line and load side. This enhances the differential mode, while the common mode remains essentially the same. The increased performance is useful in both susceptibility and emission control applications, in which maximum performance is desired.

The series is offered at 1, 3 or 6 amps. The SPC series is suitable for all types of electronic equipment. The EMI filter at the power source maximizes electromagnetic interference suppression and eliminates the need for wiring a separate filter to a power receptacle, thereby lowering the cost and improving the installation performance due to a reduction in stray wiring radiated susceptibility.



Electrical Schematic



Features

- *Thermoplastic plug housing
- *Sheet metal cover
- *6.33-mm quick-disconnect or solderable terminals

Specifications

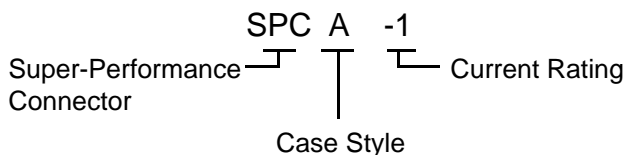
- Voltage rating:** 115 / 250 VAC
- Line frequency:** 50/60 Hz
- Leakage current (line to ground):**
 - 0.25 mA maximum at 120 VAC, 60 Hz
 - 0.50 mA maximum at 250 VAC, 50 Hz
- Test voltage:**
 - Line to ground, 2250 VDC
 - Line to line, 1450 VDC
- Current overload test:** 6X rated for 8 sec
- Insulation resistance:** 6000 megohms at 100 VDC

Performance

Current Rating	Frequency, MHz									
	.01	.02	.05	.15	.50	1	5	10	20	30
Common Mode										
1 amp	20	24	30	40	50	60	60	60	50	50 (db)
3 amp	5	10	20	30	35	45	55	60	50	50 (db)
6 amp	3	6	10	18	25	35	45	50	50	50 (db)
Differential Mode										
1 amp	0	0	2	10	34	55	60	60	45	45 (db)
3 amp	0	0	2	8	27	45	55	55	45	45 (db)
6 amp	0	0	2	9	15	40	55	55	45	45 (db)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

How to Order



UL File No. E62459.
 CSA File No. LR56661.
 VDE File No. 51403.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Ordering Information

Part No.	Dimensions, inches/mm				
	A	B**	C	D	E
1 amp					
SPCA-1*	2.00/50.80	1.17/29.72	0.81/20.57	1.57/39.88	1.97/50.04
SPCB-1*	2.00/50.80	1.17/29.72	0.81/20.57	1.57/39.88	1.97/50.04
3 amp					
SPCA-3*	2.00/50.80	1.17/29.72	0.81/20.57	1.57/39.88	1.97/50.04
SPCB-3*	2.00/50.80	1.17/29.72	0.81/20.57	1.57/39.88	1.97/50.04
6 amp					
SPCA-6*	2.00/50.80	1.17/29.72	0.81/20.57	1.57/39.88	1.97/50.04
SPCB-6*	2.00/50.80	1.17/29.72	0.81/20.57	1.57/39.88	1.97/50.04

*For small solder lug termination, add suffix L, e.g., SPCA-1 L.

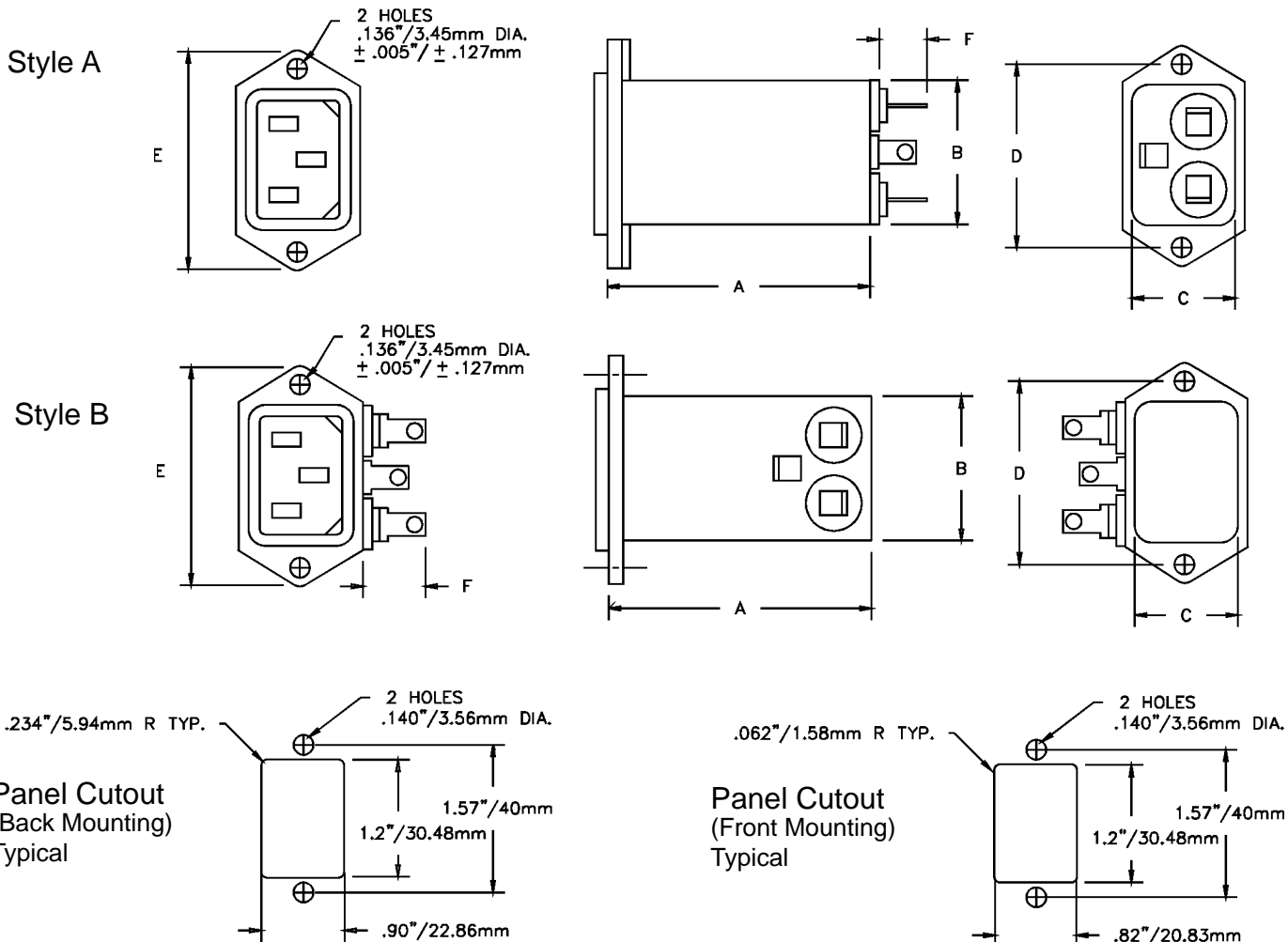
**B dimension maximum.

For 4 1/4" wire leads replacing terminals add a W to the end of any part number. For other wire lengths, check with factory.

Case Styles

F Dimensions inches/mm

.250 tab terminals: .580 max/14.73
 solder lug terminals: .450 max/1.43
 solder lug hole diameter: .078/1.98



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

CCA Series NEW

High-Performance Connector Filters

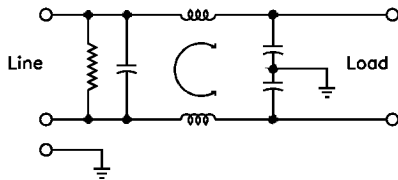
Applications

The CCA series high-performance connector filters offer the same attenuation as our HPC series in a convenient snap-in mounting package.

The filters utilize IEC power connectors, and provide protection from line-to-line and ground-to-line interference.



Electrical Schematic



Specifications

Voltage rating: 115 / 250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground):

0.25 mA maximum at 120 VAC, 60 Hz

0.50 mA maximum at 250 VAC, 50 Hz

Test voltage:

Line to ground, 2250 VDC

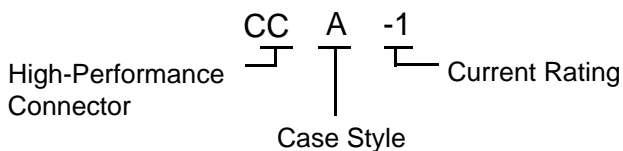
Line to line, 1450 VDC

Performance

Current Rating		Frequency, MHz							
		.15	.2	.5	1	5	10	20	30
Common Mode									
1 amp		24	30	38	42	49	52	55	55 (db)
3 amp		20	26	29	36	45	50	55	55 (db)
6 amp		14	19	23	30	41	45	50	50 (db)
Differential Mode									
	1 amp				3	10	15	20	37 37
37		36 (db)							
3 amp		3	10	15	20	37	37	37	36 (db)
6 amp		3	8	15	20	31	35	35	34 (db)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

How to Order



NRTL/C

UL, CSA and TUV approvals pending.



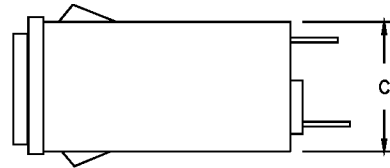
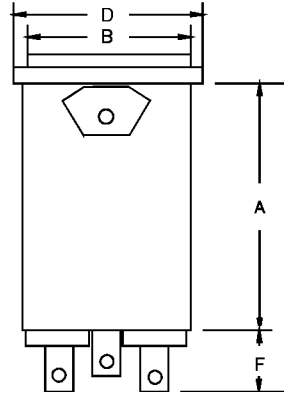
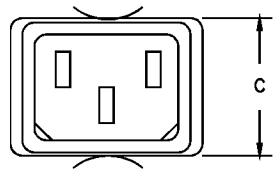
1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

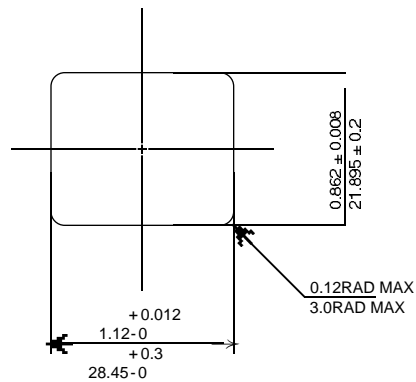
Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Case Style



CCA Pannel Cutout Series



Dimensions, inches/mm

A	B	C	D
1.55/39.37	1.12/28.4	0.84/2.13	1.26/33.5

For smaller lug termination add suffix L;
e.g., CCA-IL

F Dimensions (typical)

	inches/mm
.250 tab terminals:	.580 max/14.73
solder lug terminals:	.450 max/11.43
solder lug hole diameter:	.078/1.98



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
Telephone: (408) 369-2200 Fax: (408) 369-4911
Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

PMO Series

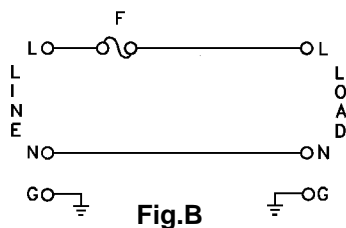
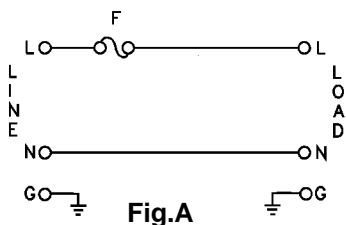
Power Entry Modules

Applications

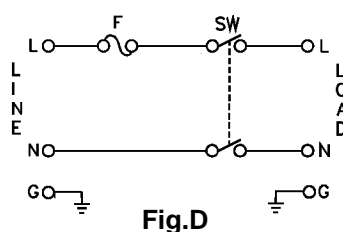
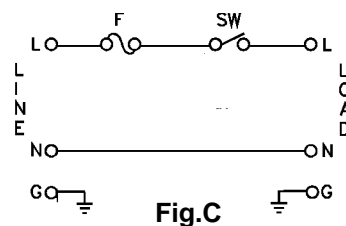
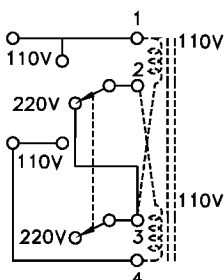
SAE Power's PMO Series power entry modules provide a plastic case that includes an IEC connector, a fuse holder, an optional power ON/OFF switch and a voltage selector switch in one single easy to mount unit. The fuse holder is designed for one IEC 5 x 20 mm fuse and one spare fuse. Safety interlock prevents fuse removal with line plug inserted. For dual fuse, consult factory.



Electrical Schematics



For transformers with two separate Windings.



Specifications

Voltage rating: 115 / 250 VAC

Line frequency: 50/60Hz

Leakage current (line to ground):

2 μ A maximum at 115 V, 60 Hz

5 μ A maximum at 250 V, 50 Hz

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC



These modules are UL recognized, CSA certified and TUV approved.

UL File No. E107489.

CSA File No. LR49272.

TUV File No. R9112004.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

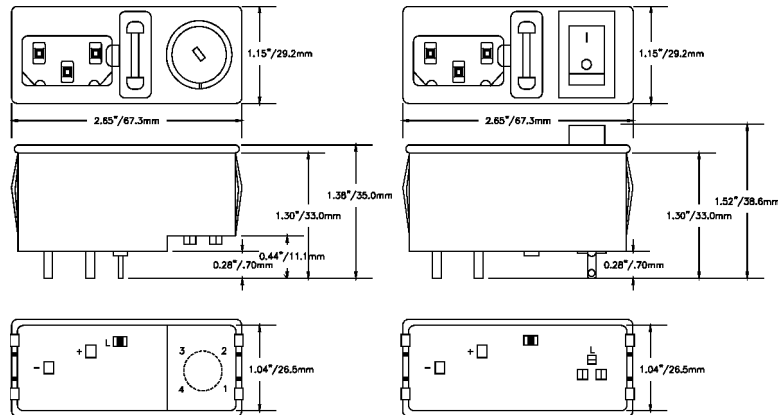
How To Order

Elect. Schematic	Part No.	PMOA6 PMOB6 PMOC6 PMOD6			
		Fig. A	Fig. C	Fig. D	Fig. B
Rated Current	115 VAC	6A	6A	6A	6A
	220 VAC	6A	6A	4A	6A
Power Switch		-	SP ¹	DP ²	-
Voltage Selector Switch		-	-	-	Front ³

Notes:

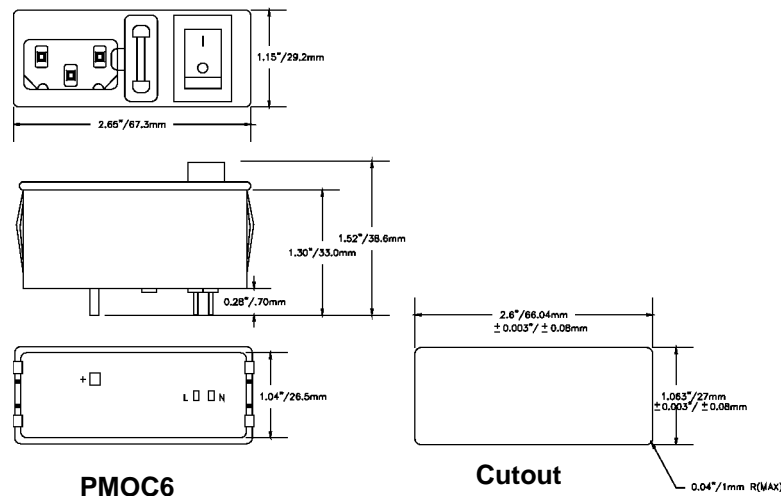
- SINGLE POLE:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A both at 125VAC & 250VAC. VDE, 6A/250VAC.
Electrical Lifetime: 50,000 cycles. **Maximum Inrush Current:** 24A.
- DOUBLE POLE:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A/125VAC & 4A/250VAC. VDE, 4A/250VAC.
Electrical Lifetime: 10,000 cycles. **Maximum Inrush Current:** 51 A.
- VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved.
Current Rating: 6A at 125VAC & 250VAC.

Case Styles



**PMOA6 (without volt selector)
PMOD6**

PMOB6



PMOC6

Cutout



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

P M 1 Series

Power Entry Modules EMI Filters

Applications

SAE Power's power entry module EMI filters provide the convenience of single-point, snap-in mounting of an IEC connector, a fuse holder with optional power ON/OFF switch and voltage selector switch plus an EMI filter. For dual fuse, consult factory.

Electrical Schematics

PM1A6 & PM1F6
WITHOUT POWER SWITCH

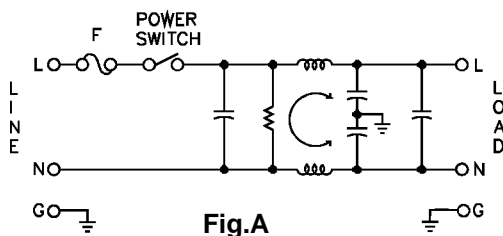


Fig.A

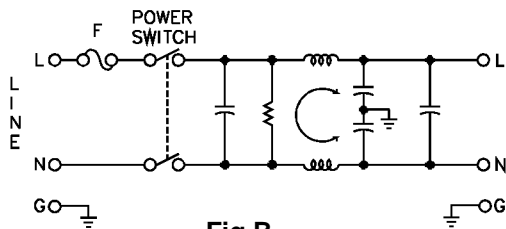
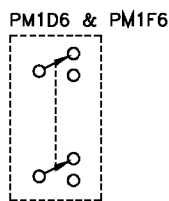


Fig.B

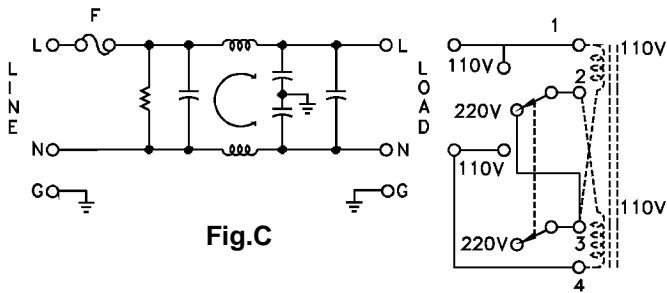
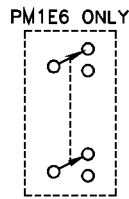


Fig.C



Specifications

Voltage rating: 115/250VAC

Line frequency: 50/60 Hz

Leakage current (line to ground):

0.25 mA maximum at 115 V, 60 Hz

0.50 mA maximum at 250 V, 50 Hz

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC

Performance

TYPE	FREQUENCY - MHz						
	.10	.15	.50	1.0	5.0	10	30
Common Mode (L-G) in 50 Ohm System							
PM1 (All)	20	24	30	35	45	50	45
Differential Mode (L-L) In 50 Ohm System							
PM1 (All)	8	10	30	45	45	45	40



These modules are UL recognized, CSA certified and TUV approved.

UL File No. E62459.

CSA File No. LR49272.

TUV File No. R9310470.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

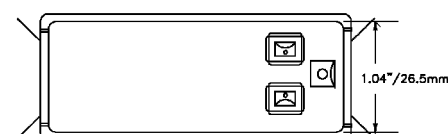
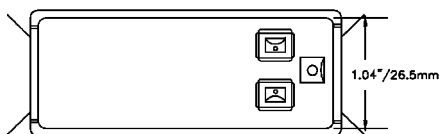
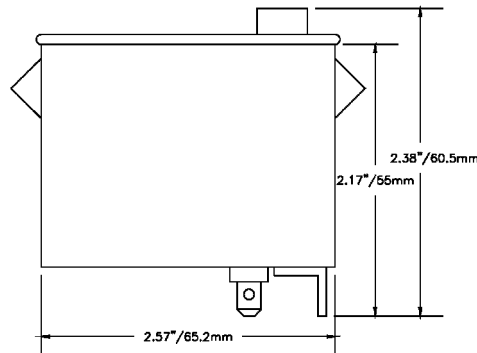
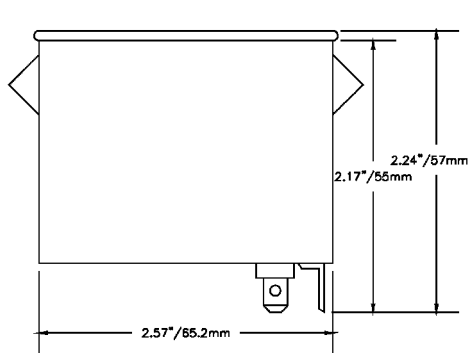
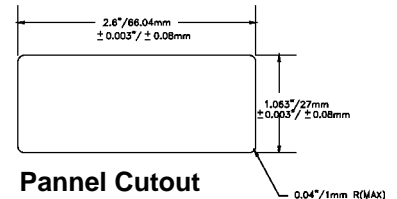
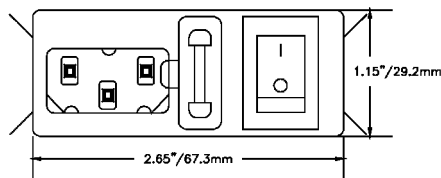
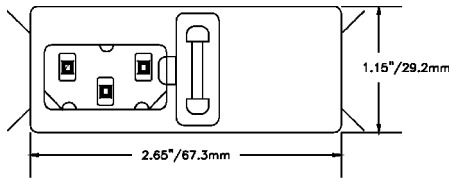
How to Order

PART NO.		PMIA6	PMIB6	PMIC6	PMID6	PMIE6	PMIF6	PMIG6
RATED	115 VAC	6A	6A	6A	6A	6A	6A	6A
CURRENT	250VAC		6A	6A	4A	5A	4A	5A
POWER SWITCH		-	SP ¹	DP ²	SP ¹	DP ²	-	
VOLTAGE SELECTOR SW		-	-	-	Rear ³	Rear ³	Rear ³	Front ⁴
ELECT SCHEMATIC FIG.		A	A	B	A	B	A	C

Notes:

- SINGLE POLE:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A both at 125VAC & 250VAC. VDE, 6A/250VAC.
Electrical Lifetime: 50,000 cycles. **Maximum Inrush Current:** 24A.
- DOUBLE POLE:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A/125VAC & 4A/250VAC. VDE, 4A/250VAC.
Electrical Lifetime: 10,000 cycles. **Maximum Inrush Current:** 51 A.
- VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved.
Current Rating: 10A/125VAC & 5A/250VAC.
- VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A both at 125VAC & 250VAC. VDE, 6A/250VAC.

Case Styles*



PM1A6
PM2A6 (see page 17)

PM1B6
PM2B6 (see page 17)
PM1C6 (w/ 1.0 mark reversed)

*Notes

- PM1D6 case style is same as PM2D6
- PM1E6 case style is same as PM2E6
- PM1F6 case style is same as PM2F6
- PM1G6 case style is same as PM2G6

PM2 Series

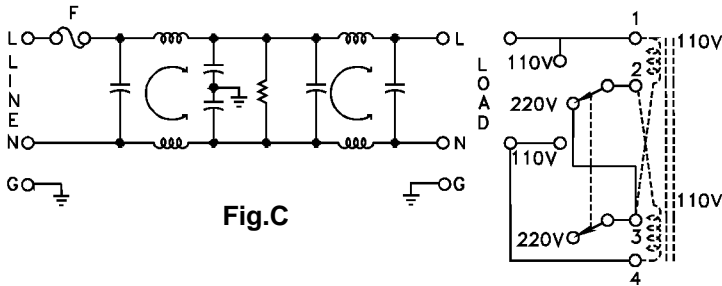
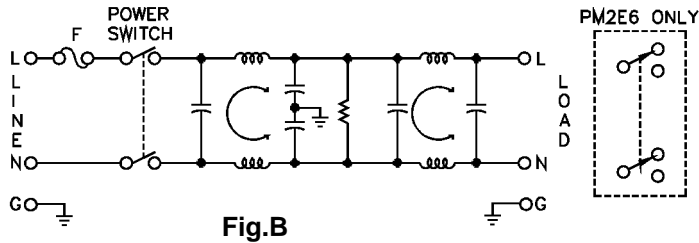
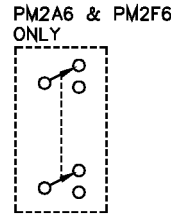
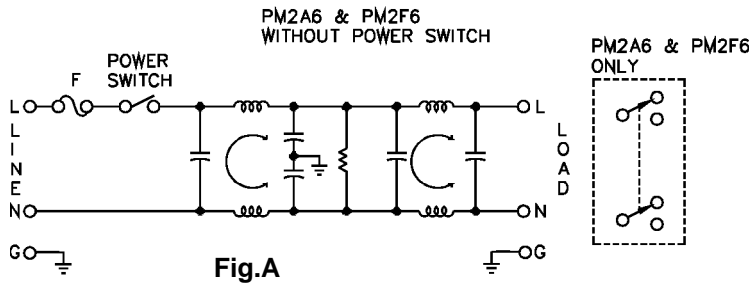
High Performance Filtered Power Modules

Applications

SAE Power's high performance filtered power modules provide the convenience of single-point, snap-in mounting of an IEC connector, a fuse holder with optional power ON/OFF switch and voltage selector switch plus an EMI filter. These two-stage filters are ideal for applications in which greater low frequency attenuation is desired. For dual fuse, consult factory.



Electrical Schematics



Specifications

- Voltage rating:** 115 / 250 VAC
- Line frequency:** 50/60 Hz
- Leakage current (line to ground):**
 - 0.25 mA maximum at 115 V, 60 Hz
 - 0.50 mA maximum at 250 V, 50 Hz
- Test Voltage:**
 - Line to ground, 2250VDC
 - Line to line, 1450 VDC

Performance

Type	Common Mode (L-G) in 50 Ohm System								
	Frequency - Mhz								
PM2 (All)	.01	.05	.10	.15	.50	1.0	5.0	10	30
	5	14	20	31	56	62	60	50	35
	Differential Mode (L-L) in 50 Ohm System								
PM2 (All)	.5	7	10	9	25	65	60	50	45



These modules are UL recognized, CSA certified and TUV approved.
 UL File No. E62459.
 CSA File No. LR49272.
 TUV File No. R9310470.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

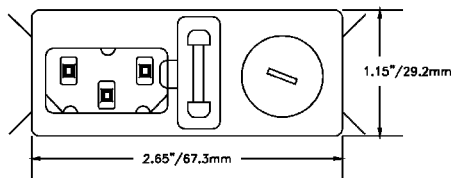
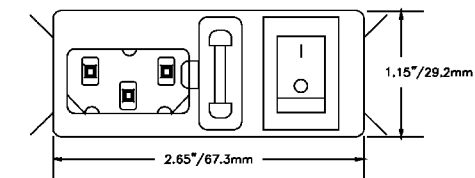
How to Order

Part No.	PM2A6	PM2B6	PM2C6	PM2D6	PM2E6	PM2F6	PM2G6
Elect. Schematic	A	A	B	A	B	A	C
Rated Current	115 VAC 6A	115 VAC 6A	115 VAC 6A	115 VAC 6A	115 VAC 6A	115 VAC 6A	115 VAC 6A
	220 VAC 6A	220 VAC 6A	220 VAC 4A	220 VAC 5A	220 VAC 4A	220 VAC 5A	220 VAC 6A
Power Switch	-	SP ¹	DP ²	SP ¹	DP ²	-	-
Voltage Selector Sw.	-	-	-	Rear ³	Rear ³	Rear ³	Front ⁴

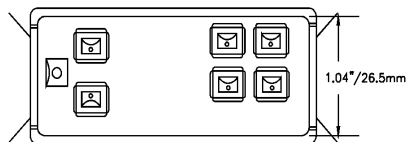
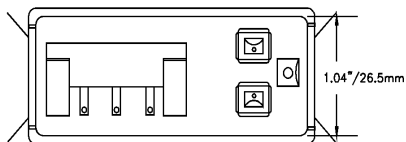
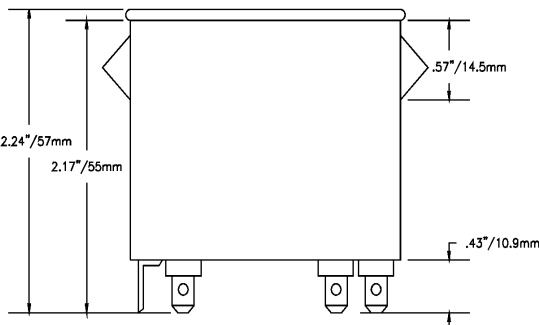
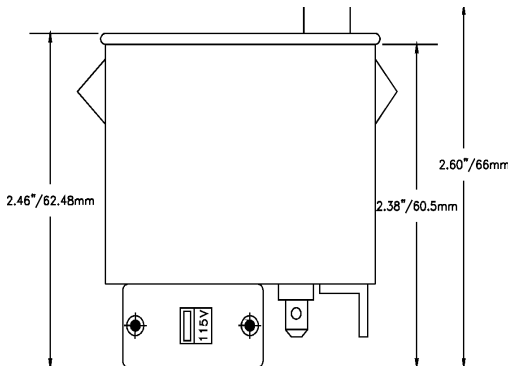
Notes:

- SINGLE POLE:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A both at 125VAC & 250VAC. VDE, 6A/250VAC.
Electrical Lifetime: 50,000 cycles. **Maximum Inrush Current:** 24A.
- DOUBLE POLE:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A/125VAC & 4A/250VAC. VDE, 4A/250VAC.
Electrical Lifetime: 10,000cycles. **Maximum Inrush Current:** 51A.
- VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved.
Current Rating: 10A/125VAC & 5A/250VAC.
- VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A both at 125VAC & 250VAC. VDE, 6A/250VAC.

Case Styles

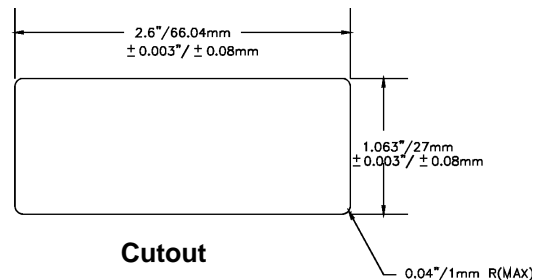


PM2A6 case style is same as PM1A6
 PM2B6 case style is same as PM1B6
 PM2C6 is same as PM1C6, w/ 1,0 mark reversed



PM2B6 (w/out rear voltage selector)
 PM2D6
 PM2E6 (w/ 1, 0 mark reversed)
 PM2F6 (w/out power switch)

PM2G6



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

PMS Series

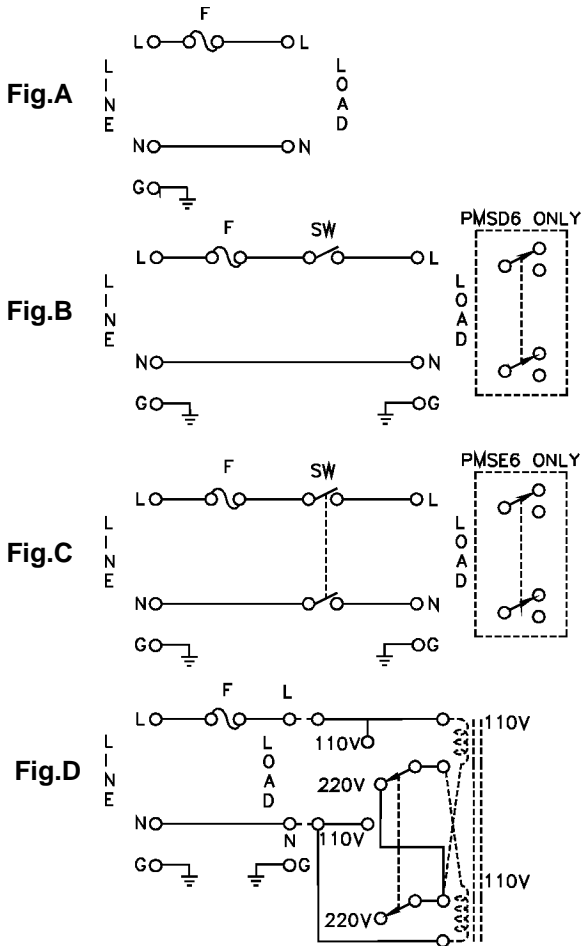
Shielded Power Entry Modules

Applications

SAE Power's PMS Series power entry modules provide a metal case that includes an IEC connector, a fuse holder, an optional power ON/OFF switch and a voltage selector switch in one single easy to mount unit. The fuse holder is designed for one IEC 5 x 20 mm fuse and one spare fuse. Safety interlock prevents fuse removal with line plug inserted. Useful in applications requiring shielded power entry. For dual fuse, consult factory.



Electrical Schematics



FOR TRANSFORMERS WITH TWO SEPARATE WINDINGS

Specifications

Voltage rating: 115/250VAC

Line frequency: 50/60 Hz

Leakage current (line to ground):

2 μ A maximum at 115 V, 60 Hz

5 μ A maximum at 250 V, 50 Hz

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC



These modules are UL recognized, CSA certified and TUV approved.

UL File No. E107489.

CSA File No. LR49272.

TUV File No. R9112004.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

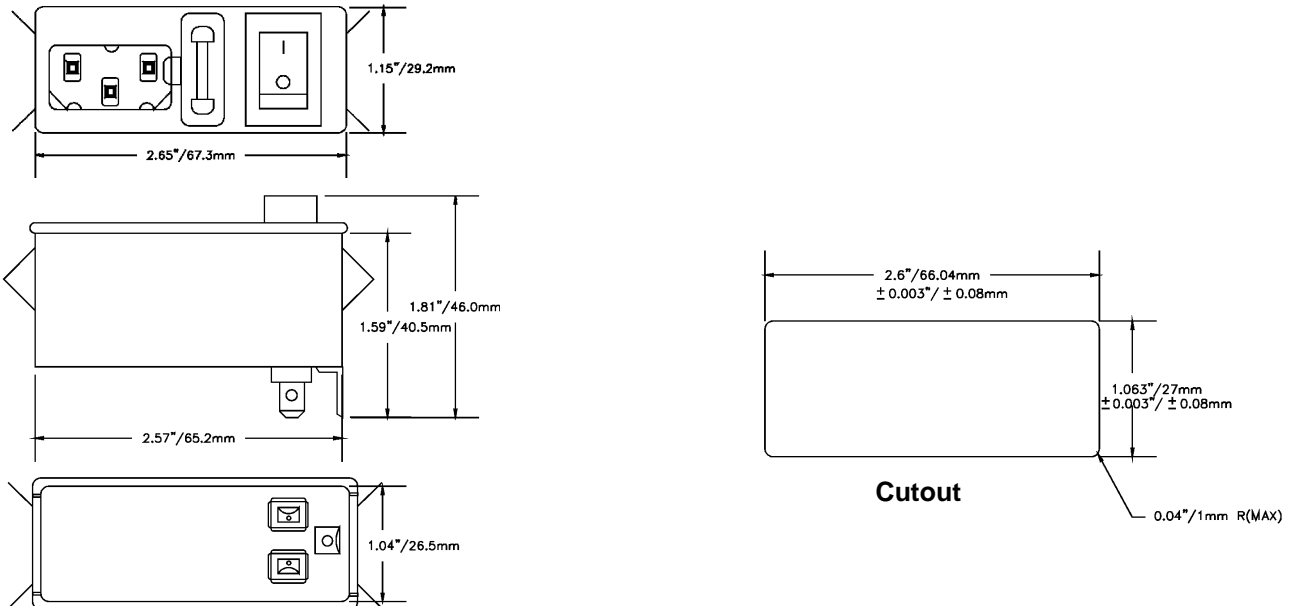
How to Order

Part No.	PMSA6	PMSB6	PMSC6	PMSD6	PMSE6	PMSF6
Elect. Schematic	A	B	C	B	C	D
Rated Current	115 VAC 220 VAC	6A 6A	6A 4A	6A 5A	6A 4A	6A 6A
Power Switch	-	SP ¹	DP ²	SP ¹	DP ²	-
Voltage Selector Sw.	-	-	-	Rear ³	Rear ³	Front ⁴

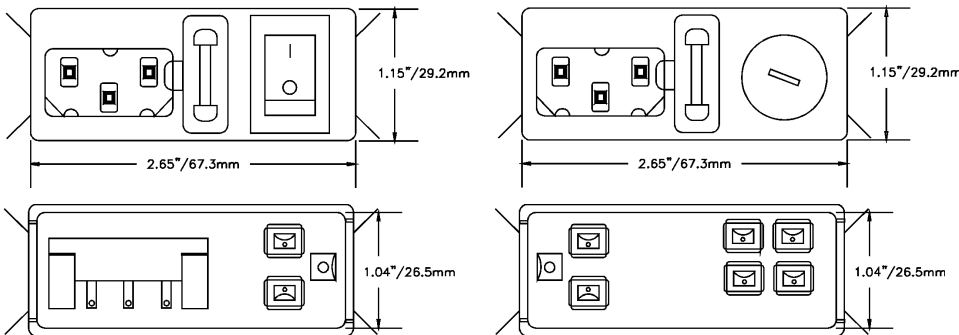
Notes:

- SINGLE POLE:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A both at 125VAC & 250VAC. VDE, 6A/250VAC.
Electrical Lifetime: 50,000 cycles. **Maximum Inrush Current:** 24A.
- DOUBLE POLE:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A/125VAC & 4A/250VAC. VDE, 4A/250VAC.
Electrical Lifetime: 10,000cycles. **Maximum Inrush Current:** 51A.
- VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved.
Current Rating: 10A/125VAC & 5A/250VAC.
- VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved.
Current Rating: UL & CSA, 6A both at 125VAC & 250VAC. VDE, 6A/250VAC.

Case Styles



PMSA6 (w/out power switch)
PMSB6
PMSC6 (w/ 1, 0 mark reversed)



PMSD6
PMSE6 (w/ 1, 0 mark reversed)

PMSF6



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

FCF Series

Fused Connector Filters

Applications

SAE Power's fused connector filters (FCF series) feature an IEC power input receptacle. This installation eliminates virtually all interference coupling around the filter. In addition, the series accepts a 5 x 20-mm fuse for circuit protection, and is rated at 1, 2, 3, 4 or 6 amps.

The FCF series is suitable for all types of electronic equipment. The EMI filter at the power source maximizes electromagnetic interference suppression and eliminates the need for wiring a separate filter to a power receptacle, lowering the cost and improving the installation performance.

How to Order

Series Code FCF 1 -1 Current Rating

Termination

To order solder lug termination, change 1 to 2



Electrical Schematic



Features

- *Thermoplastic plug housing
- *Sheet metal cover
- *6.3-mm quick-disconnect or solderable terminals
- *Fuse one single pole (L)
- *Fuse, 5 x 20-mm (Not furnished)
- *Space for spare fuse.

Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground*):

0.50 mA maximum at 115 V, 60 Hz

1.25 mA maximum at 250 V, 50 Hz

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC

Current overload test: 6x rated for 8 sec.

Insulation resistance: 6000 megohms at 100 VDC

*Low leakage current models (less than 0.5 mA at 250 VAC, 50 Hz) may be ordered by using the prefix L on part number, e.g. LFCF 1-1



UL File No. E62459.

CSA File No. LR56661.

VDE File No. 41801.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

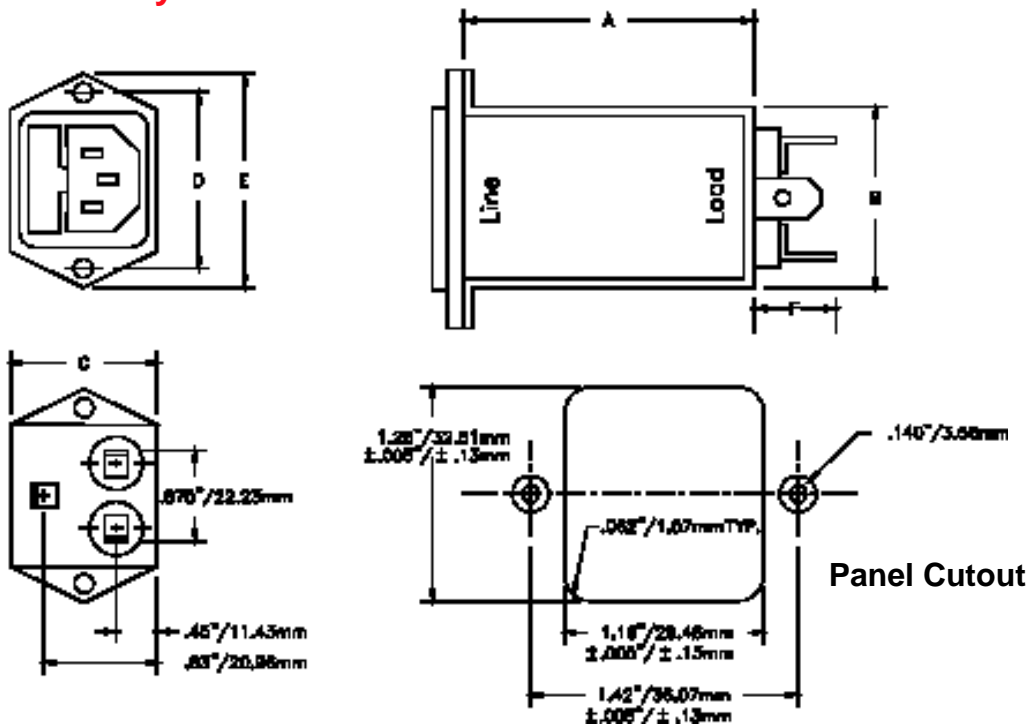
© 2001 SAE Power Inc

Performance

Current Rating	Frequency, MHz									
	.01	.02	.05	.15	.5	1	5	10	20	30
Common mode										
1 amp	20	24	30	40	50	60	60	60	50	50 (dB)
2 amp	10	15	25	35	43	50	55	55	55	50 (dB)
3 amp	5	10	20	30	35	45	55	60	50	50 (dB)
4 amp	4	8	15	25	30	40	50	56	50	50 (dB)
6 amp	3	6	10	18	25	35	45	50	50	50 (dB)
Differential mode										
1 amp	1	1	1	3	14	23	50	46	44	44 (dB)
2 amp	1	1	1	2	12	20	45	43	42	42 (dB)
3 amp	1	1	1	2	11	14	44	42	40	40 (dB)
4 amp	1	1	1	2	10	14	40	40	40	40 (dB)
6 amp	1	1	1	2	10	13	39	40	42	42 (dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

Case Style



Ordering Information

	Part No.	Dimensions, inches/mm				
		A	B	C	D	E
1 amp	FCF1-1	2.00/50.80	1.13/28.58	1.25/31.75	1.42/36.07	1.70/43.18
2 amp	FCF1-2	2.00/50.80	1.13/28.58	1.25/31.75	1.42/36.07	1.70/43.18
3 amp	FCF1-3	2.00/50.80	1.13/28.58	1.25/31.75	1.42/36.07	1.70/43.18
4 amp	FCF1-4	2.00/50.80	1.13/28.58	1.25/31.75	1.42/36.07	1.70/43.18
6 amp	FCF1-6	2.00/50.80	1.13/28.58	1.25/31.75	1.42/36.07	1.70/43.18

F Dimensions (typical)

	inches/mm
.250 tab terminals:	.580 max/14.73
lug hole diameter:	.078/1.98
solder lug terminals:	.450 max/11.43



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

FPM Series

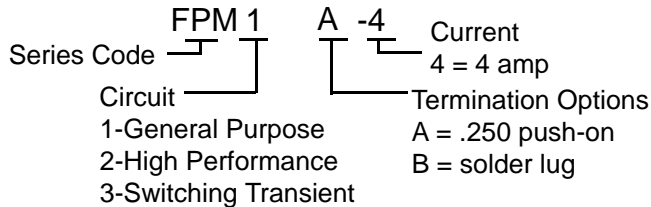
Filtered Power

Applications

SAE Power's filtered power modules (FPM series) provide the convenience of single-point, snap-in mounting of an IEC power input receptacle, on/off switch, fuse protection circuit with voltage selector feature and electromagnetic interference filter.

In addition, by providing filtering at the power input location, excellent isolation between line and load wiring is obtained. Other filter isolation schemes frequently result in coupling around the filter because of careless wire routing or improper case grounding. Consequently, many otherwise adequate filters are rendered ineffective, and the system or device in which they are installed may fail to comply with conducted or radiated emission requirements.

How to Order



Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground*):

0.50 mA maximum at 115 V, 60 Hz

1.25 mA maximum at 250 V, 50 Hz

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC

Current overload test: 6x rated for 8 sec.

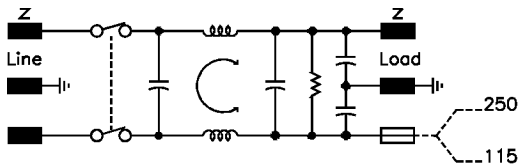
Insulation resistance: 6000 megaohms at 100 VDC

*Low leakage current models (less than 0.5 mA at 250 VAC, 50 Hz) may be ordered by using the prefix L on part number, eg, LFPM1A-2.

Note: Unit accepts 5x20mm or 1/4 x 1 1/4" fuse.
Not furnished.

Electrical Schematics

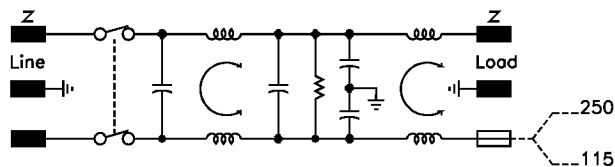
Circuit 1



General Purpose

Satisfies many filtering requirements for test equipment, games, computers and peripherals, and electromechanical devices which must comply with FCC levels A and B.

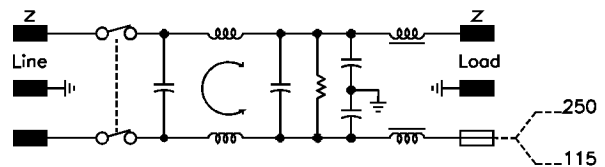
Circuit 2



High Performance

Useful where better insertion loss is needed at mid and high frequencies, as in some computers, microprocessors, RF generators, etc.

Circuit 3



Switching Transient

Use on equipment with switching power supplies or electro-mechanical switching devices. Also useful where greater differential mode rejection is required.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Performance

Current Rating

General Purpose

	Frequency, MHz									
	.01	.02	.05	.15	.5	1	5	10	20	30
Common mode										
2 amp	16	19	27	39	55	53	52	52	54	55 (dB)
4 amp	15	20	25	33	40	45	50	50	45	35 (dB)
6 amp	4	7	14	25	40	47	52	54	49	49 (dB)
Differential mode										
2 amp	0	1	1	39	66	71	61	58	61	45 (dB)
4 amp	1	5	10	20	55	65	60	55	50	50 (dB)
6 amp	0	2	6	27	59	66	55	50	53	51 (dB)

High Performance

Common mode

2 amp	15	12	40	65	65	65	60	60	45	45 (dB)
4 amp	17	11	43	70	65	65	65	50	45	45 (dB)
6 amp	10	14	23	56	65	65	65	60	60	60 (dB)

Differential Mode

2 amp	0	0	0	45	55	55	55	50	45	45 (dB)
4 amp	0	2	4	33	65	65	65	65	60	60 (dB)
6 amp	0	2	7	13	65	60	55	55	55	55 (dB)

Switching Transient

Common mode

2 amp	13	18	25	38	65	65	60	50	50	50 (dB)
4 amp	10	17	24	31	65	65	60	60	55	55 (dB)
6 amp	8	13	21	30	55	55	60	60	55	55 (dB)

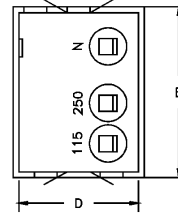
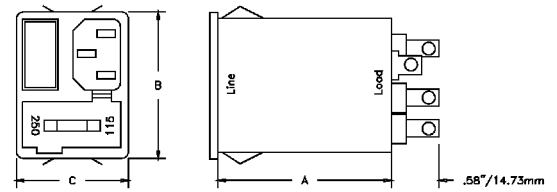
Differential mode

2 amp	0	0	12	40	60	60	60	60	45	45 (dB)
4 amp	0	2	10	41	65	65	65	60	45	45 (dB)
6 amp	0	2	9	23	65	65	65	60	50	50 (dB)

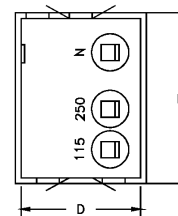
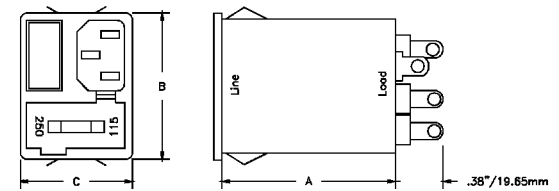
Minimum insertion loss in 50-ohm system per MIL-STD-220A.

Case Styles

Style A

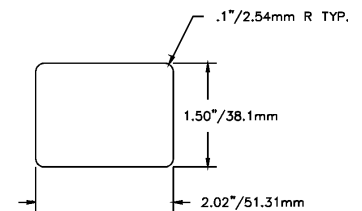


Style B



Ordering Information

		Dimensions, inches/mm				
Part No.		A	B	C	D	E
2 amp	FPM1A-2	2.50/63.50	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM1B-2	2.50/63.50	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM2A-2	2.50/63.50	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM2B-2	2.50/63.50	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM3A-2	2.50/63.50	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM3B-2	2.50/63.50	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
4 amp	FPM1A-4	2.50/63.50	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM1B-4	2.50/63.50	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM2A-4	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM2B-4	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM3A-4	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM3B-4	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
6 amp	FPM1A-6	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM1B-6	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM2A-6	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM2B-6	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM3A-6	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53
	FPM3B-6	3.00/76.20	2.05/52.07	1.50/38.10	1.47/37.34	1.95/49.53



Panel Cutout



UL File No. E62459.
 CSA File No. LR56661.
 VDE File No. 49970.
 TUV File No. R70159 for FPM1A-6 only.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

ESS Series

Power Entry Modules

Applications

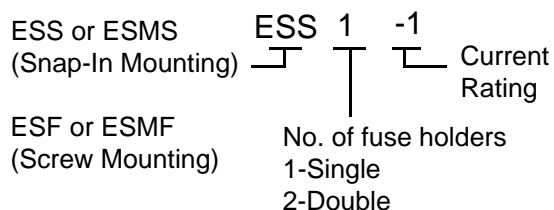
The ESS Series (Snap-in Mounting) and ESF (Flange Mounting) modules are for general purpose applications where line-to-line & line-to-ground noise must be controlled. This series is offered with a 1, 3, 6 or 10 amp rating.

The ESMS Series (Snap-in Mounting) & ESMF Series (Flange Mounting) are designed for medical applications. They provide very low leakage current to meet medical and dental equipment requirement of UL 2601 & IEC 601. This series is offered with 6 amp EMI filter rating.

All of the above series provide an IEC connector, single or double fuses and 2-pole power ON/OFF switch.

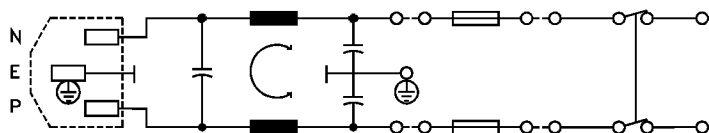


How to Order

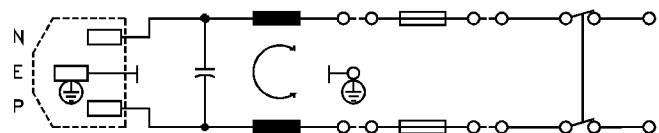


Electrical Schematics

ESS / ESF Series



ESMS / ESMF Series



Features

IEC connector
Single or Dual Fuse Option

Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground):

0.25 mA maximum at 115 V, 60 Hz (for ESS and ESF Series)

0.50 mA maximum at 250 V, 50 Hz (for ESS and ESF Series)

3.00 μ A maximum at 115 V, 60 Hz (for ESMS and ESMF Series)

5.00 μ A maximum at 250 V, 50 Hz (for ESMS and ESMF Series)

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC

Ordering Information

Part No.	Dimensions, inches/mm			
	A	B	C	D
1 amp				
ESS1-1, ESS2-1	1.53/38.86	2.13/54.10	1.10/27.94	1.26/32.00
ESF1-1, ESF2-1	1.53/38.86	2.13/54.10	1.10/27.94	1.57/39.88
3 amp				
ESS1-3, ESS2-3	1.53/38.86	2.13/54.10	1.10/27.94	1.26/32.00
ESF1-3, ESF2-	1.53/38.86	2.13/54.10	1.10/27.94	1.57/39.88
6 amp				
ESS1-6, ESS2-6	1.53/38.86	2.13/54.10	1.10/27.94	1.26/32.00
ESF1-6, ESF2-6	1.53/38.86	2.13/54.10	1.10/27.94	1.57/39.88
ESMS1-6	1.53/38.86	2.13/54.10	1.10/27.94	1.26/32.00

Performance

Current Rating	.15	.5	Frequency, MHz				
			1	3	5	10	30
Common Mode							
1 amp							
ESS1-1, ESS2-1	14	17	24	35	40	30	25 (dB)
ESF1-1, ESF2-1	14	17	24	35	40	30	25 (dB)
3 amp							
ESS1-3, ESS2-3	8	15	18	30	32	38	30 (dB)
ESF1-3, ESF2-3	8	15	18	30	32	38	30 (dB)
6 amp							
ESS1-6, ESS2-6	6	12	17	25	31	35	20 (dB)
ESF1-6, ESF2-6	6	12	17	25	31	35	20 (dB)
ESMS1-6	8	12	15	18	18	18	18 (dB)
ESMS2-6	8	12	15	18	18	18	18 (dB)
ESMF1-6	8	12	15	18	18	18	18 (dB)
ESMF2-6	8	12	15	18	18	18	18 (dB)
10 amp							
ESS1-10	2	5	10	20	28	30	15 (dB)
ESS2-10	2	5	10	20	28	30	15 (dB)
ESF1-10	2	5	10	20	28	30	15 (dB)
ESF2-10	2	5	10	20	28	30	15 (dB)

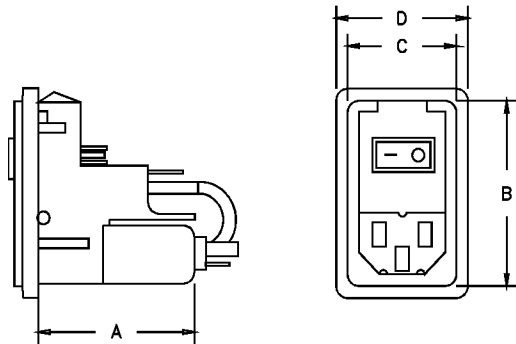
Minimum insertion loss in 50-Ohm system per MIL-STD-220A.

Current Rating	.15	.5	Frequency, MHz				
			1	3	5	10	30
Differential Mode							
1 amp							
ESS1-1, ESS2-1	2	10	15	23	30	40	45 (dB)
ESF1-1, ESF2-1	2	10	15	23	30	40	45 (dB)
3 amp							
ESS1-3, ESS2-3	2	10	15	23	26	45	47 (dB)
ESF1-3, ESF2-3	2	10	15	23	26	45	47 (dB)
6 amp							
ESS1-6, ESS2-6	4	12	20	25	25	40	45 (dB)
ESF1-6, ESF2-6	4	12	20	25	25	40	45 (dB)
ESMS1-6	4	8	15	28	32	35	35 (dB)
ESMS2-6	4	8	15	28	32	35	35 (dB)
ESMF1-6	4	8	15	28	32	35	35 (dB)
ESMF2-6	4	8	15	28	32	35	35 (dB)
10 amp							
ESS1-10	1	5	15	20	25	30	40 (dB)
ESS2-10	1	5	15	20	25	30	40 (dB)
ESF1-10	1	5	15	20	25	30	40 (dB)
ESF2-10	1	5	15	20	25	30	40 (dB)

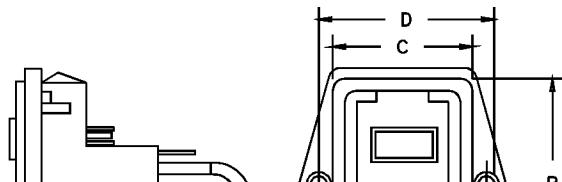
Minimum insertion loss in 50-Ohm system per MIL-STD-220A.

Case Styles

ESS / ESMS Series



ESF / ESMF Series



F Dimensions (typical)

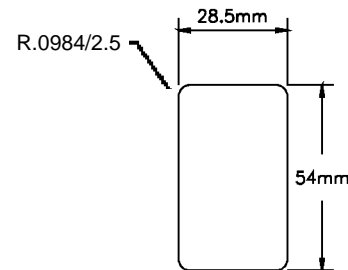
.250 tab terminals:
mounting hole:

inches/mm

.580 max/14.73
.188/4.78

Panel Cutout (typical)

ESS / ESMS Series



ESF / ESMF Series

28.5mm

EX Series

Power Entry Modules

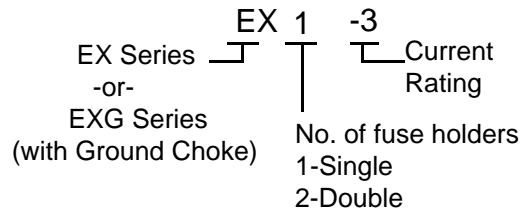
Applications

SAE Power's EX Series power entry modules provide an ALL-IN-ONE install unit. It incorporates an IEC connector, single or dual fuse holder(s) and optional voltage selector switch. It adapts to 110-120V or 220-240V input voltage simply by reversing the fuse cartridge.

A ground choke in the EXG Series is used to provide very effective suppression of high frequency EMI noise.

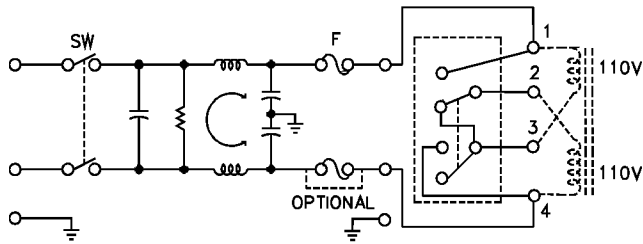
Both EX and EXG models are offered with a 3, 6 or 10 amp rating.

How to Order

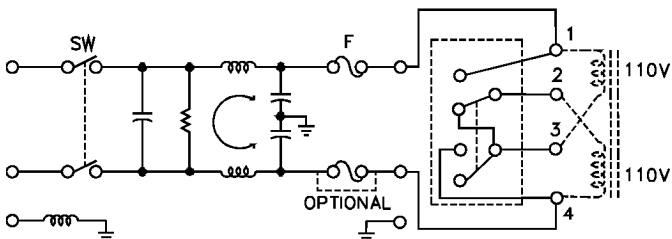


Electrical Schematics

EX Series



EXG Series



Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground):

0.25 mA maximum at 115 V, 60 Hz (for EX and EXG Series)

0.50 mA maximum at 250 V, 50 Hz (for EX and EXG Series)

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC

Ordering Information

Part No.	Dimensions, inches/mm			
	A	B	C	D
3 amp				
EX1-3, EX2-3	2.76/70.10	1.14/29.00	1.12/28.50	1.575/40.00
EXG1-3, EXG2-3	2.76/70.10	1.14/29.00	1.12/28.50	1.575/40.00
6 amp				
EX1-6, EX2-6	2.76/70.10	1.14/29.00	1.12/28.50	1.575/40.00
EXG1-6, EXG2-6	2.76/70.10	1.14/29.00	1.12/28.50	1.575/40.00

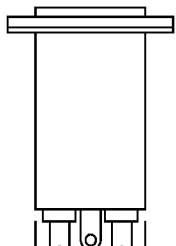
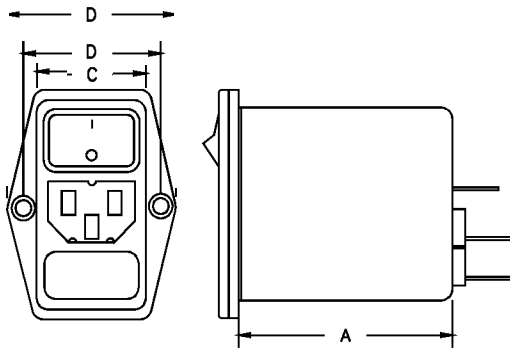
Performance

		Frequency, MHz					
Current Rating	.05	.1	.15	1	5	10	30
Common Mode							
3 amp							
EX1-3, EX2-3	10	15	20	35	45	45	30 (dB)
EXG1-3, EXG2-3	10	15	20	35	45	40	25 (dB)
6 amp							
EX1-6, EX2-6	5	8	12	25	35	40	35 (dB)
EXG1-6, EXG2-6	5	8	15	25	40	30	20 (dB)
10 amp							
EX1-10, EX2-10	5	8	12	25	35	40	35 (dB)
EXG1-10	5	8	12	25	45	35	20 (dB)
EXG2-10	5	8	12	25	45	35	20 (dB)
Differential Mode							
3 amp							
EX1-3, EX2-3	5	8	12	30	40	45	30 (dB)
EXG1-3, EXG2-3	2	8	12	30	35	40	30 (dB)
6 amp							
EX1-6, EX2-6	2	5	8	20	30	40	40 (dB)
EXG1-6, EXG2-6	2	5	8	30	45	50	40 (dB)
10 amp							
EX1-10, EX2-10	2	5	8	25	35	45	35 (dB)
EXG1-10	2	5	8	30	35	50	40 (dB)
EXG2-10	2	5	8	30	35	50	40 (dB)

Minimum insertion loss in 50-Ohm system per MIL-STD-220A.

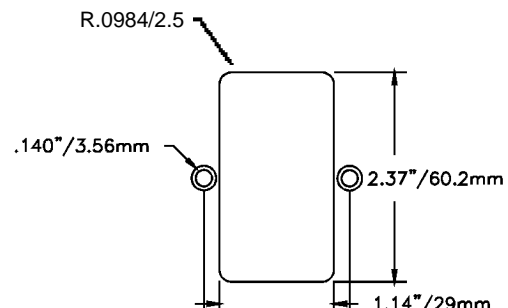
Case Style

EX / EXG Series



Panel Cutout (typical)

EX / EXG Series



EY Series

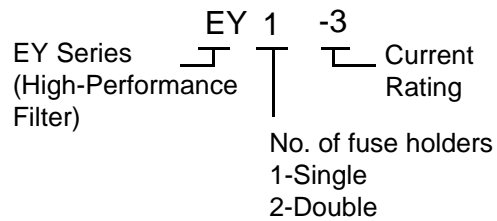
High Performance Power Entry Modules

Applications

SAE Power's high-performance EY Series power entry modules provide an ALL-IN-ONE install unit. It incorporates an IEC connector, single or dual fuse holder(s), optional voltage selector switch and double pole power ON/OFF switch. It adapts to 110-120V or 220-240V input voltage simply by reversing the fuse cartridge.

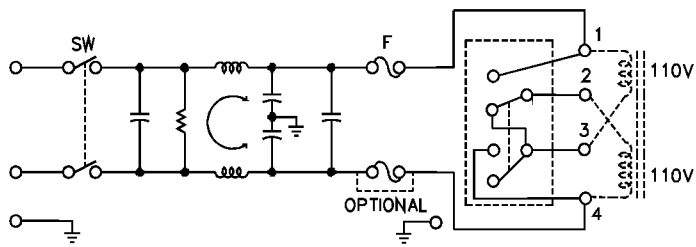
This series is offered with a 3, 6 or 10 amp rating.

How to Order



Electrical Schematics

EY Series



Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground):
0.30 mA maximum at 115 V, 60 Hz
0.50 mA maximum at 250 V, 50 Hz

Test Voltage:
Line to ground, 2250 VDC
Line to line, 1450 VDC

Features

IEC connector
Single or Dual Fuse Option
2-pole ON/OFF Switch

Ordering Information

Part No. A B C D

3 amp

Dimensions, inches/mm

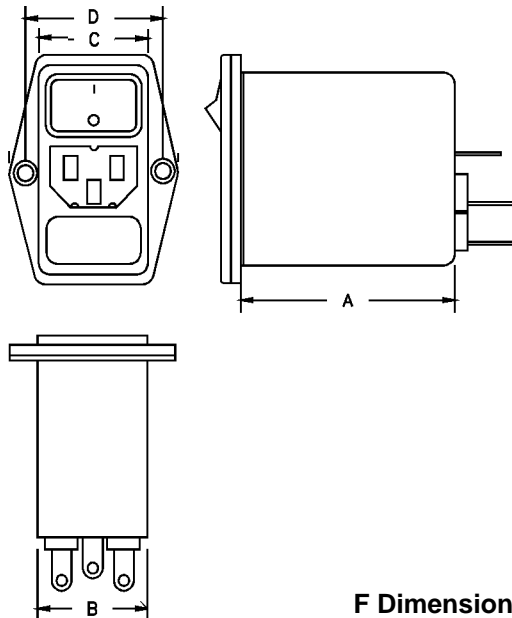
Performance

	Frequency, MHz						
	.05	.1	.15	1	5	10	30
Current Rating							
Common Mode							
3 amp							
EY1-3, EY2-3	24	30	34	38	38	38	25 (dB)
6 amp							
EY1-6, EY2-6	10	15	20	35	40	40	30 (dB)
10 amp							
EY1-10, EY2-10	5	10	15	25	37	40	30 (dB)
Differential Mode							
3 amp							
EY1-3, EY2-3	2	5	12	55	40	40	35 (dB)
6 amp							
EY1-6, EY2-6	2	5	5	50	40	40	40 (dB)
10 amp							
EY1-10, EY2-10	2	5	5	45	40	40	30 (dB)

Minimum insertion loss in 50-Ohm system per MIL-STD-220A.

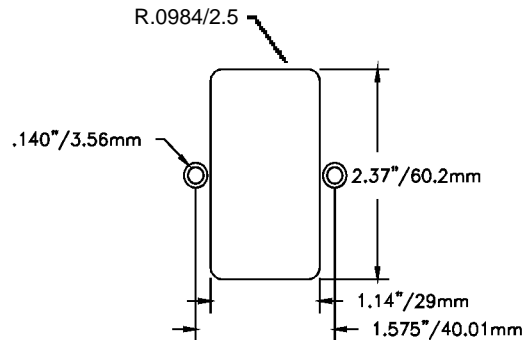
Case Style

EY Series



Panel Cutout (typical)

EY Series



F Dimensions (typical)

	inches/mm
.250 tab terminals:	.580 max/14.73
mounting hole:	.188/4.78

SPGA Series

Super-Performance General Application Filters

Applications

The super-performance, general application filters (SPGA series) have significantly higher low frequency performance than the standard GA series. These filters are designed to provide greater reduction of conducted noise below 1MHz.

The L prefix versions meet the leakage requirements of VDE and SEV portable equipment and IEC 2601 (120-volt) non-patient medical equipment.

Connector Styles (SPGA7 and SPGA8)

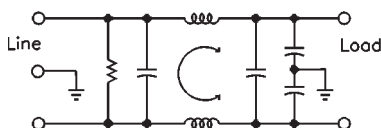
This series incorporates the IEC (International Electrotechnical Commission) power line connector with the filter in one package for bulkhead mounting. These filters eliminate the need for installing a separate IEC connector and wiring it to the filter. As a result, the cost of the finished product is lowered and performance is increased due to a reduction in stray wiring radiated susceptibility.



How to Order



Electrical Schematic



Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground*):

0.50 mA maximum at 115 V, 60 Hz

1.00 mA maximum at 250 V, 50 Hz

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC

Current overload test: 6x rated for 8 sec.

Insulation resistance: 6000 megohms at 100 VDC

*Low leakage current models (less than 0.5 mA at 250 VAC, 50 Hz) may be ordered by using the prefix L on part number, e.g. LSPGA1B-3.

Performance

	Frequency, MHz										
	.01	.02	.05	.10	.15	.50	1	5	10	20	30
Current Rating											
Common Mode											
3, 6 and 10 amp	4	8	18	25	29	43	44	42	42	38	30 (dB)
Differential Mode											
3, 6 and 10 amp	1	1	2	10	25	59	65	62	40	40	40 (dB)

Minimum insertion loss in 50 ohm system per MIL-STD-220A.
Low leakage current models are approximately 6 dB lower insertion loss than standard units.



UL File No. E62459.
CSA File No. LR49272.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
Telephone: (408) 369-2200 Fax: (408) 369-4911
Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Ordering Information

Part No.	Dimensions, inches/mm				
	A	B	C	D	E
3 amp					
SPGA1B-3	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
SPGA2B-3	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
SPGA3B-3	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
SPGA7B-3	2.50/63.50	2.00/50.80	1.13/28.70	1.57/40.00	0.63/16.00
SPGA8B-3	2.50/63.50	2.00/50.80	1.13/28.70	1.57/40.00	0.63/16.00
6 amp					
SPGA1B-6	3.00/76.20	2.19/55.63	1.25/31.75	3.43/87.12	3.80/96.52
SPGA2B-6	3.00/76.20	2.19/55.63	1.25/31.75	3.43/87.12	3.80/96.52
SPGA3B-6	3.00/76.20	2.19/55.63	1.25/31.75	3.43/87.12	3.80/96.52
SPGA7B-6	3.00/76.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00
SPGA8B-6	3.00/76.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00
10 amp					
SPGA1B-10	3.63/92.20	2.19/55.63	1.75/44.45	4.06/103.12	4.44/112.78
SPGA2B-10	3.63/92.20	2.19/55.63	1.75/44.45	4.06/103.12	4.44/112.78
SPGA3B-10	3.63/92.20	2.19/55.63	1.75/44.45	4.06/103.12	4.44/112.78
SPGA7B-10	3.63/92.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00
SPGA8B-10	3.63/92.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00

F Dimensions (typical)

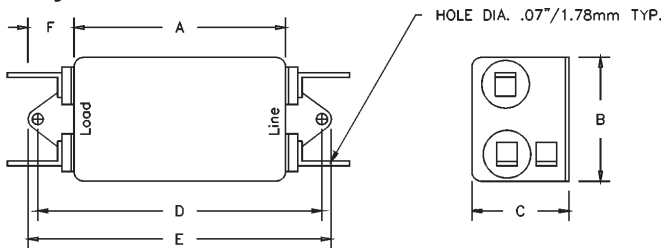
inches/mm

.250 tab terminals:	.580 max/14.73
18-gauge wire leads:	4.25 min/107.95
mounting hole:	.188/4.78

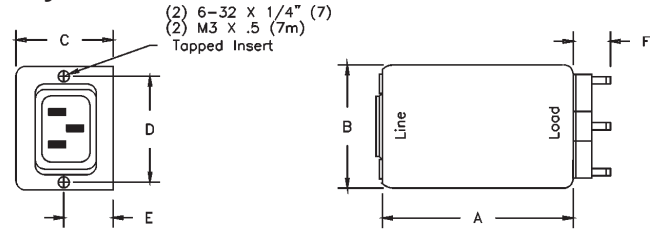
Prefix "L" may be added to indicate Low Leakage.

Case Styles

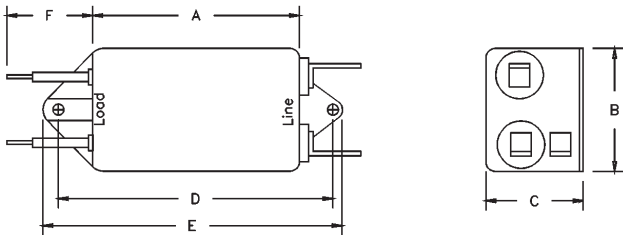
Style 1



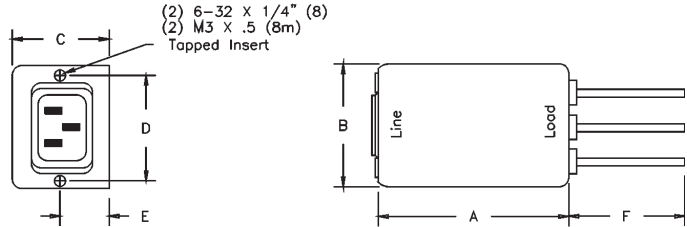
Style 7 or 7m



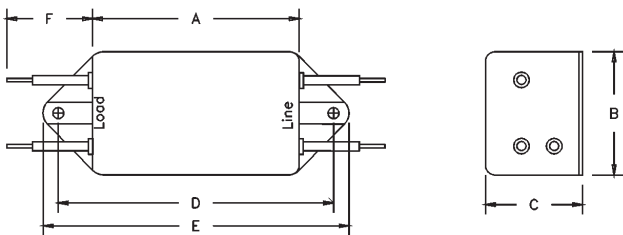
Style 2



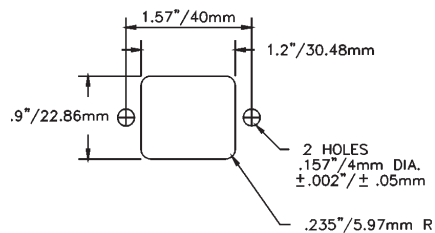
Style 8 or 8m



Style 3



Panel Cutout



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

HP Series

High-Performance Filters

Applications

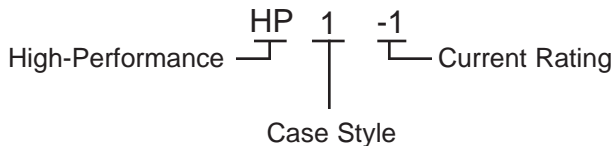
The high-performance filters provide high attenuation for low-impedance loads, such as motors and switching power supplies. They are intended for use in severe EMI environments. These filters are designed to help meet the new IEC requirements where conducted emissions from the equipment to the power line must be further suppressed.

Connector Styles (HP7 and HP8)

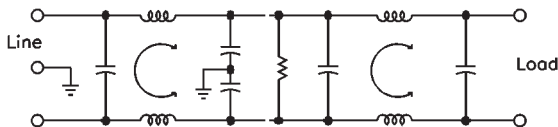
This series incorporates the IEC (International Electrotechnical Commission) power line connector with the filter in one compact package for bulkhead mounting. These filters eliminate the need for installing a separate IEC connector and wiring it to the filter.



How to Order



Electrical Schematic



Performance

Current Rating	Frequency, MHz						
	.15	.50	1	5	10	20	30
Common Mode							
1, 2, 3, and 5 amp	30	65	65	65	65	65	65 (dB)
10 amp	20	44	60	65	65	60	60 (dB)
20 amp	10	44	55	65	65	60	55 (dB)
30 amp	8	44	55	65	65	60	55 (dB)
Differential Mode							
1, 2, 3, and 5 amp	9	30	65	60	55	50	45 (dB)
10 amp	9	10	35	60	55	50	45 (dB)
20 amp	9	10	35	60	55	50	45 (dB)
30 amp	9	10	35	60	55	50	45 (dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

Specifications

Voltage rating: 115/250 VAC
Line frequency: 50/60 Hz
Leakage current (line to ground*):
 0.50 mA maximum at 115 V, 60 Hz
 1.00 mA maximum at 250 V, 50 Hz
Test Voltage:
 Line to ground, 2250 VDC
 Line to line, 1450 VDC

*Low leakage current models (less than 0.5 mA at 250 VAC, 50 Hz) may be ordered by using the prefix L on part number, e.g. LHP1-1. These units offer 6dB lower insertion loss.

F Dimensions (typical)

	inches/mm
.250 tab terminals:	.580 max/14.73
18-gauge wire leads:	4.25 min/107.95
threaded terminal:	8-32 x .675 max 26.50
mounting hole:	.188/4.78 (except as noted)

Note: HP7 and HP8 series are TUV approved. All others (except 20- and 30-amp units) have both VDE and TUV approvals. 20- and 30-amp units are VDE approved.



These filters are recognized under the components program of Underwriters Laboratories, Inc. and the Canadian Standards Association.

UL File No. E62459. CSA File No. LR49272.
 TUV File No. R30001. VDE File No. 27905.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

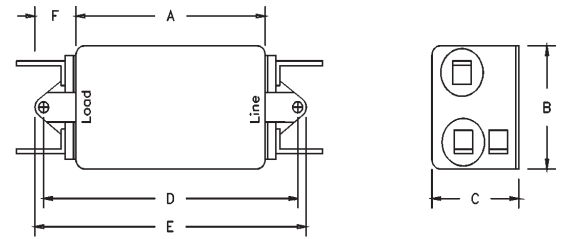
Ordering Information

		Dimensions, inches/mm				
	Part No.	A	B	C	D	E
1 amp	HP1-1	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	HP2-1	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	HP3-1	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
2 amp	HP1-2	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	HP2-2	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	HP3-2	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
3 amp	HP1-3	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	HP2-3	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	HP3-3	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
5 amp	HP1-3L	2.00/50.80	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
	HP2-3L	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
	HP3-3L	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
	HP7-3	2.50/63.50	2.00/50.80	1.25/31.75	1.57/40.00	0.63/16.00
	HP8-3	2.50/63.50	2.00/50.80	1.25/31.75	1.57/40.00	0.63/16.00
	HP1-5	2.50/63.50	2.00/50.80	1.13/28.70	2.38/60.45	3.32/84.32
	HP2-5	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
	HP3-5	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
10 amp	HP7-5	2.50/63.50	2.00/50.80	1.25/31.75	1.57/40.00	0.63/16.00
	HP8-5	2.50/63.50	2.00/50.80	1.25/31.75	1.57/40.00	0.63/16.00
	HP1-10	2.50/63.50	2.00/50.80	1.50/38.10	2.38/60.45	3.32/84.32
	HP2-10	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
20 amp	HP3-10	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
	HP4-10	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
	HP7-10	3.25/82.55	2.00/50.80	1.50/38.10	1.57/40.00	0.63/16.00
	HP8-10	3.25/82.55	2.00/50.80	1.50/38.10	1.57/40.00	0.63/16.00
30 amp	HP1-20	3.88/98.55	3.31/84.07	1.50/38.10	3.75/95.25	4.12/104.65
	HP5-20	3.88/98.55	3.31/84.07	1.50/38.10	3.75/95.25	4.12/104.65
30 amp	HP6-30	5.25/133.35	3.00/76.20	3.00/76.20	5.63/143.00	5.99/152.15

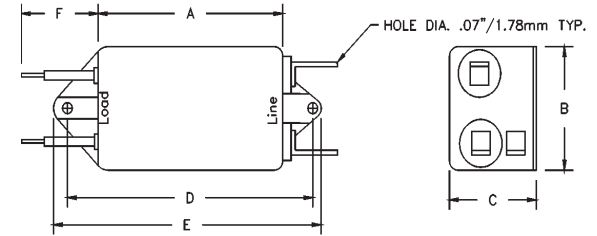
Case Styles

* 1, 2 and 3 amp units require small mounting ears.

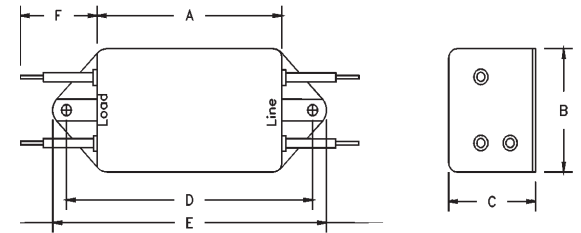
Style 1*



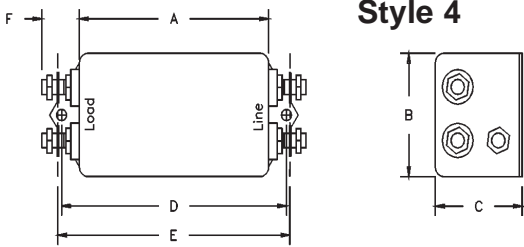
Style 2



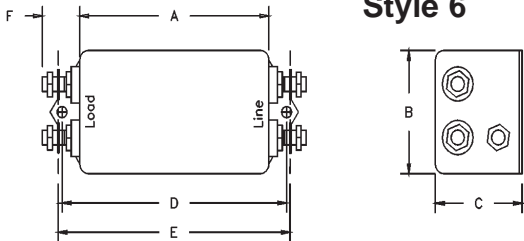
Style 3



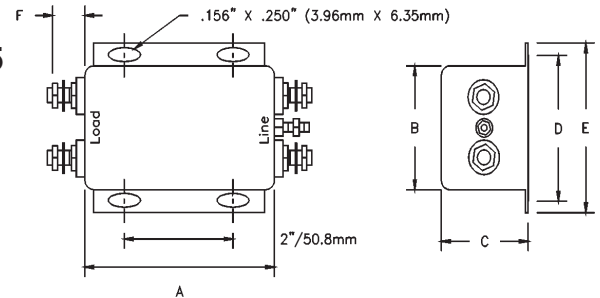
Style 4



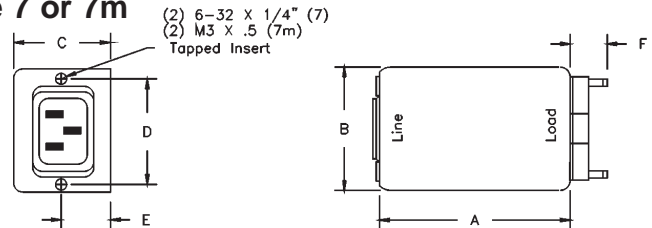
Style 6



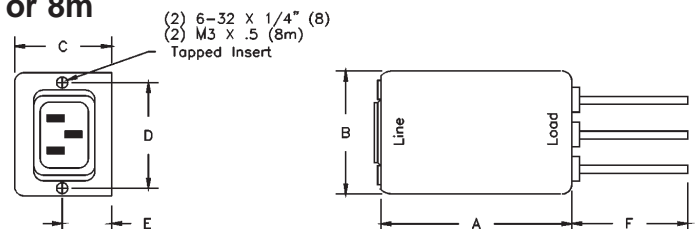
Style 5



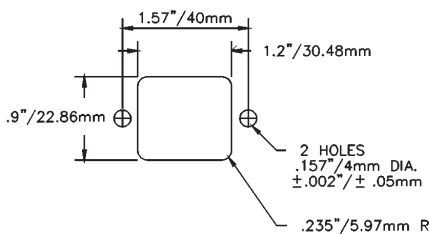
Style 7 or 7m



Style 8 or 8m



Panel Cutout



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

ST Series

Switching Transient Filters

Applications

These filters reduce switching transients to acceptable levels by combining common and differential mode rejection characteristics, providing optimum performance at minimum leakage current. They are particularly effective for reducing interference from line to equipment (i.e., susceptibility problems). They are also effective in reducing equipment interference to meet VDE, FCC and CISPR requirements. Switching power supplies require much higher filter rejection characteristics to enable these devices to comply with requirements of VDE 0875. Circuit D filters are designed to provide this high attenuation without impeding peak switching currents. They assist in meeting UL and IEC standards.



Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground*):

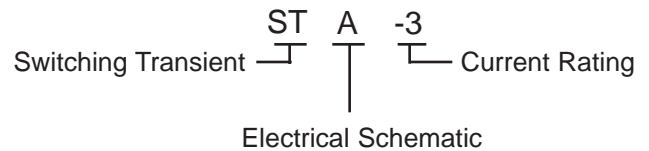
- 0.50 mA maximum at 115 V, 60 Hz for circuits A, B, and D.
- 1.00 mA maximum at 250 V, 50 Hz for circuits A, B, and D.
- 2.00 mA maximum at 115 V, 60 Hz for circuit C.
- 3.00 mA maximum at 250 V, 50 Hz for circuit C.

Test Voltage:

- Line to ground, 2250 VDC
- Line to line, 1450 VDC

*Low leakage current models (less than 0.5 mA at 250 VAC, 50 Hz) may be ordered by using the prefix L on part number, eg. LSTA-3.

How to Order

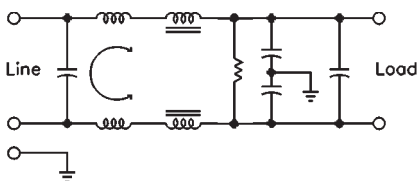


Peak Current Ratings Maximum

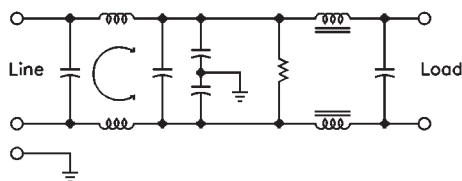
3 amp	17 amp
6 amp	23 amp
10 amp	34 amp

Electrical Schematics

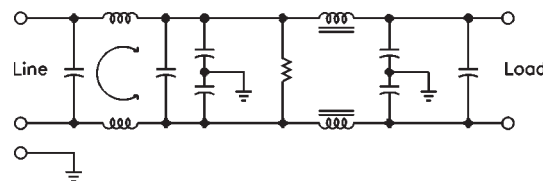
Circuit A



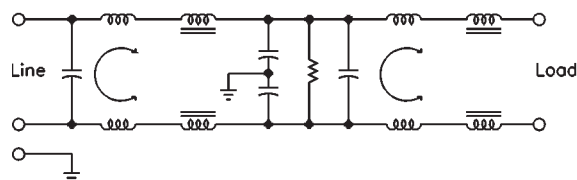
Circuit B



Circuit C



Circuit D



F Dimensions (typical)

inches/mm

- .250 tab terminals: .580 max/14.73
- threaded terminals: 8-32 x .675 max/26.50
- mounting hole: .188/4.78 (except as noted)



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

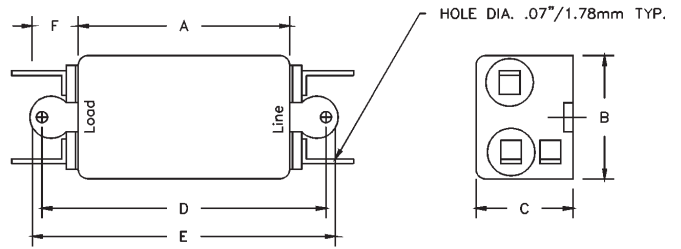
Performance

Current Rating	Frequency, MHz					
	.15	.50	1	5	10	30
Common Mode						
STA						
3, 6 and 10 amp	15	30	39	30	50	42 (dB)
20 and 30 amp	15	30	38	23	43	40 (dB)
STB						
3, 6 and 10 amp	15	30	43	60	55	46 (dB)
20 and 30 amp	15	30	41	60	46	30 (dB)
STC						
3, 6 and 10 amp	13	25	34	65	65	63 (dB)
20 and 30 amp	13	30	35	65	65	53 (dB)
STD						
3, 6 and 10 amp	65	70	70	70	65	55 (dB)
20 and 30 amp	30	60	60	50	45	45 (dB)
Differential Mode						
STA						
3, 6 and 10 amp	40	65	65	55	50	50 (dB)
20 and 30 amp	40	65	65	65	53	50 (dB)
STB						
3, 6 and 10 amp	25	65	65	60	55	50 (dB)
20 and 30 amp	40	65	65	65	60	55 (dB)
STC						
3, 6 and 10 amp	25	65	65	62	55	38 (dB)
20 and 30 amp	28	65	65	65	65	65 (dB)
STD						
3, 6 and 10 amp	60	70	70	70	60	60 (dB)
20 and 30 amp	50	70	70	70	60	60 (dB)

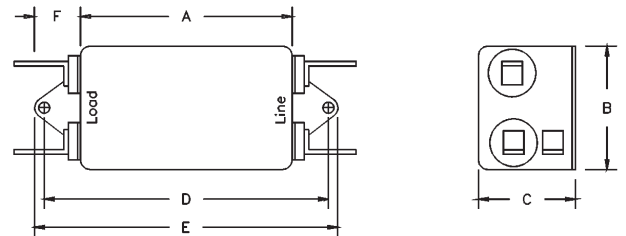
Minimum insertion loss in 50-ohm system per MIL-STD-220A.
Special low-leakage-current models are approximately 6 dB lower insertion loss than standard units.

Case Styles

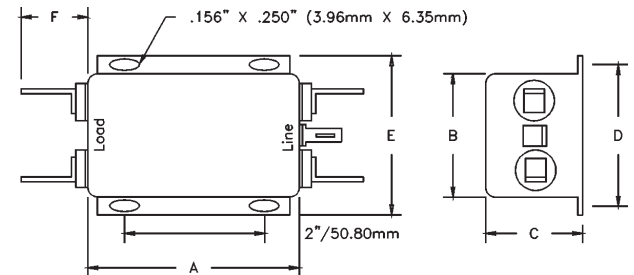
STA-3, STB-3, STC-3, STA-6, STB-6 and STC-6



STA-6L, STB-6L, STC-6L, STA-10, STB-10 and STC-10



STA-20, STB-20 and STC-20

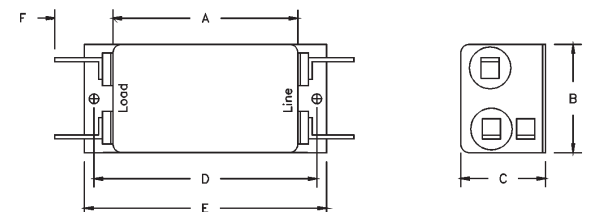


Ordering Information

Part No.	Dimensions, inches/mm					
	A	B	C	D	E	
3 amp	STA-3	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	STB-3	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	STC-3	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	STD-3	5.25/133.35	2.00/50.80	1.75/44.45	5.63/143.00	5.99/152.15
6 amp	STA-6	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	STB-6	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	STC-6	2.00/50.80	1.75/44.45	1.13/28.70	2.38/60.45	2.75/69.85
	STA-6L	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
	STB-6L	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
	STC-6L	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
10 amp	STD-6	5.25/133.35	2.50/63.50	2.25/57.15	5.63/143.00	5.99/152.15
	STA-10	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
	STB-10	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
	STC-10	2.50/63.50	2.00/50.80	1.50/38.10	2.94/74.68	3.32/84.32
20 amp	STD-10	5.25/133.35	2.50/63.50	2.75/69.85	5.63/143.00	5.99/152.15
	STA-20	3.88/98.55	3.31/84.07	1.50/38.10	3.75/95.25	4.12/104.65
	STB-20	3.88/98.55	3.31/84.07	1.50/38.10	3.75/95.25	4.12/104.65
	STC-20	3.88/98.55	3.31/84.07	1.50/38.10	3.75/95.25	4.12/104.65
30amp	STD-20	5.25/133.35	3.00/76.20	3.00/76.20	5.63/143.00	5.99/152.15
	STA-30	5.25/133.35	3.00/76.20	3.00/76.20	5.63/143.00	5.99/152.15
	STB-30	5.25/133.35	3.00/76.20	3.00/76.20	5.63/143.00	5.99/152.15
	STC-30	5.25/133.35	3.00/76.20	3.00/76.20	5.63/143.00	5.99/152.15
	STD-30	8.00/203.20	4.00/101.60	3.50/88.90	8.63/219.20	9.18/233.17

STD-20, STA-30, STB-30, STC-30 and STD-30

STD-3, STD-6 and STD-10



These filters are recognized under the components program of Underwriters Laboratories, Inc. and the Canadian Standards Association.
UL File No. E62459. CSA File No. LR56661. TUV approvals STC-10 & STC-6L (#R70479), STD-20 (#R50389), STC-20, STB-20 and STA-20 (#R60555) Only. STA, B, C, D-30 (#R50389).



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
Telephone: (408) 369-2200 Fax: (408) 369-4911
Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

STE Series

Switching Transient Filters

Applications

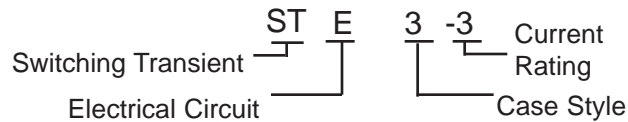
The STE series of EM filters are designed to reduce equipment interference effectively to help meet VDE 0871/0875 requirements. These filters reduce switching transients to acceptable levels by combining common and differential mode rejection characteristics and by providing optimum performance at minimum leakage current.

Connector Styles (STE-7 and STE-8)

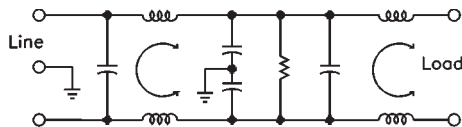
This series incorporates the IEC (International Electrotechnical Commission) power line connector with the STE series filter in one compact package for bulkhead mounting. These filters eliminate the need for installing a separate IEC connector and wiring it to the filter. As a result, the cost of the finished product is lowered and performance is increased.



How to Order



Electrical Schematic



Performance

Current Rating	Frequency, MHz							
	.01	.05	.15	.2	.5	10	20	30
Common Mode	1	10	58	60	65	60	57	55 (dB)
Differential Mode	1	4	36	50	65	65	55	50 (dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

Specifications

Voltage rating: 115/250 VAC
Line frequency: 50/60 Hz
Leakage current (line to ground):
 0.25 mA maximum at 115 V, 60 Hz
 0.50 mA maximum at 250 V, 50 Hz
Test Voltage:
 Line to ground, 2250 VDC
 Line to line, 1450 VDC



These filters are recognized under the components program of Underwriters Laboratories, Inc. and the Canadian Standards Association.

UL File No. E62459. CSA File No. LR49272.
 TUV File No. R30001. VDE File No. 51473.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

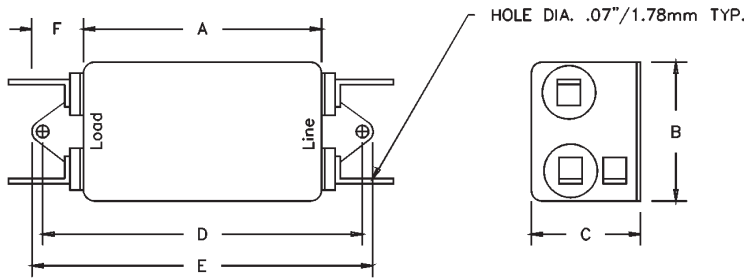
Ordering Information

		Dimensions, inches/mm				
	Part No.	A	B	C	D	E
1 amp	STE1-1	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STE2-1	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STE3-1	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
3 amp	STE1-3	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STE2-3	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STE3-3	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STE7-3	2.50/63.50	2.00/50.80	1.75/44.45	1.57/40.00	3.32/84.32
	STE8-3	2.50/63.50	2.00/50.80	1.75/44.45	1.57/40.00	0.63/16.00
6 amp	STE1-6	5.25/133.35	2.00/50.80	2.25/57.15	5.63/143.00	6.00/152.00
	STE2-6	5.25/133.35	2.00/50.80	2.25/57.15	5.63/143.00	6.00/152.00
	STE3-6	5.25/133.35	2.00/50.80	2.25/57.15	5.63/143.00	6.00/152.00
	STE7-6	5.25/133.35	2.25/57.15	2.00/50.80	1.57/40.00	0.63/16.00
	STE8-6	5.25/133.35	2.25/57.15	2.00/50.80	1.57/40.00	0.63/16.00
10 amp	STE1-10	5.25/133.35	2.00/50.80	2.75/69.85	5.63/143.00	6.00/152.00
	STE2-10	5.25/133.35	2.00/50.80	2.75/69.85	5.63/143.00	6.00/152.00
	STE3-10	5.25/133.35	2.00/50.80	2.75/69.85	5.63/143.00	6.00/152.00
	STE7-10	5.25/133.35	2.25/57.15	2.00/50.80	1.57/40.00	0.63/16.00
	STE8-10	5.25/133.35	2.25/57.15	2.00/50.80	1.57/40.00	0.63/16.00

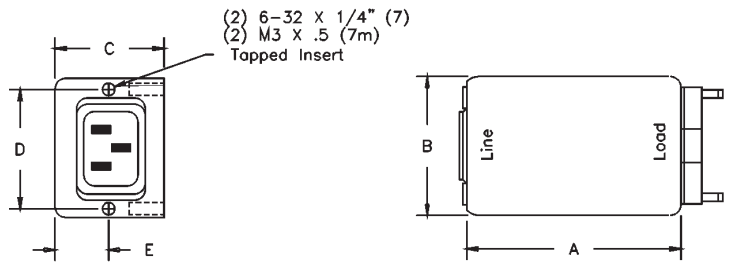
F Dimensions (typical)	inches/mm
.250 tab terminals:	.580 max/14.73
threaded terminals:	8-32 x .675 max/26.50
mounting hole:	.188/4.78 (except as noted)
18-gauge wire leads:	4.25 min/107.95

Case Styles

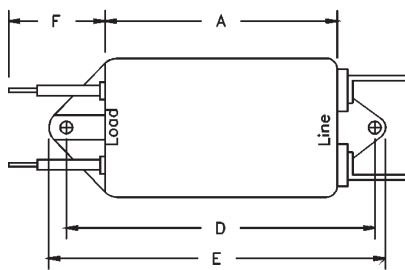
Style 1



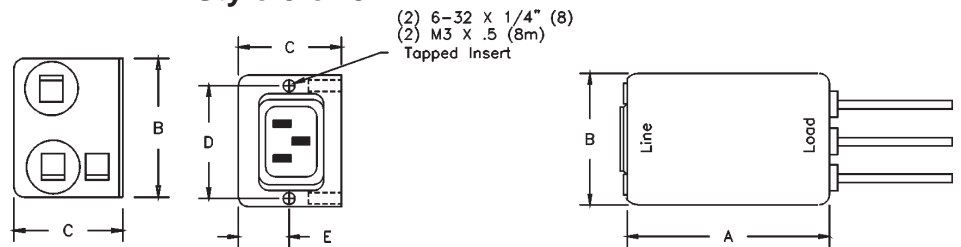
Style 7 or 7m



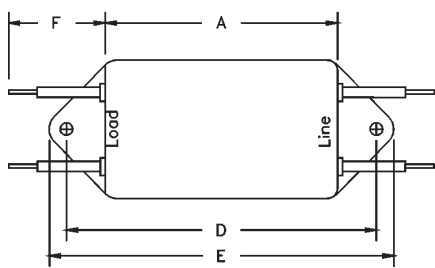
Style 2



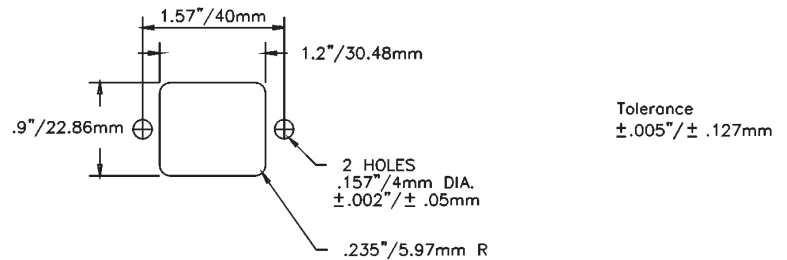
Style 8 or 8m



Style 3



Panel Cutout



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
Telephone: (408) 369-2200 Fax: (408) 369-4911
Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

STG Series

Switching Transient General Application Filters

Applications

The switching transient, general application filters (STG series) have significantly better low frequency performance than the SPGA series. These filters are designed to provide greater reduction of conducted interference to meet acceptable limits of both FCC and VDE specifications with greater margins and, in some cases, may replace the STE series' performance at less expense.

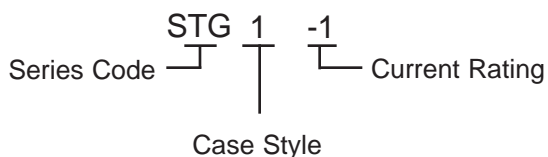
The switching transient general application filters meet the leakage requirements of VDE and SEV portable equipment and IEC 2601 (120-volt) nonpatient medical equipment.

Connector Styles (STG7 and STG8)

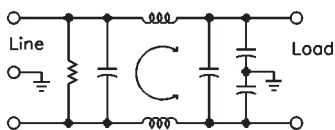
This series incorporates the IEC (International Electrotechnical Commission) power line connector with the STG series filter in one compact package for bulkhead mounting. These filters eliminate the need for installing a separate IEC connector and wiring it to the filter. As a result, the cost of the finished product is lowered and performance is increased.



How to Order



Electrical Schematic



Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground*):

0.50 mA maximum at 115 V, 60 Hz

1.00 mA maximum at 250 V, 50 Hz

Test Voltage:

Line to ground, 2250 VDC

Line to line, 1450 VDC

Current overload test: 6x rated for 8 sec.

Insulation resistance: 6000 megaohms at 100 VDC

*Low leakage current models (less than 0.5 mA at 250 VAC, 50 Hz) may be ordered by using the prefix L on part number, e.g., LSTG 1-1.

Performance

Current Rating	Frequency, MHz										
	.01	.02	.05	.10	.15	.50	1	5	10	20	30
Common	18	23	30	38	43	47	45	44	40	45	37
Differential	3	4	18	40	50	70	70	62	50	50	50

Minimum insertion loss in 50-Ohm system per MIL-STD-220A.



UL File No. E62459.

CSA File No. LR49272.

TUV File No. R60226.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Ordering Information

		Dimensions, inches/mm				
	Part No.	A	B	C	D	E
1 amp	STG1-1	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
	STG3-1	2.50/63.50	2.00/50.80	1.13/28.70	2.94/74.68	3.32/84.32
	STG7-1	3.00/76.20	2.19/55.63	1.25/31.75	1.57/40.00	0.63/16.00
3 amp	STG1-3	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STG3-3	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STG7-3	3.00/76.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00
6 amp	STG1-6	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STG3-6	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32
	STG7-6	3.00/76.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00
	STG8-6	3.00/76.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00

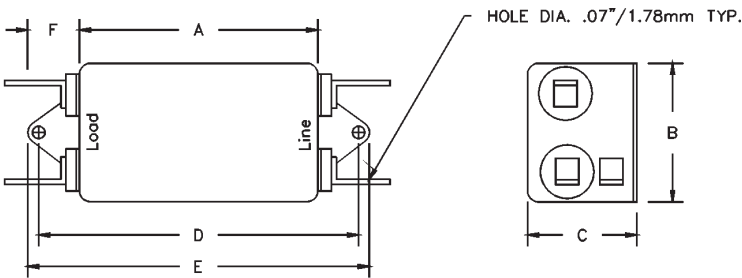
F Dimensions (typical)

inches/mm

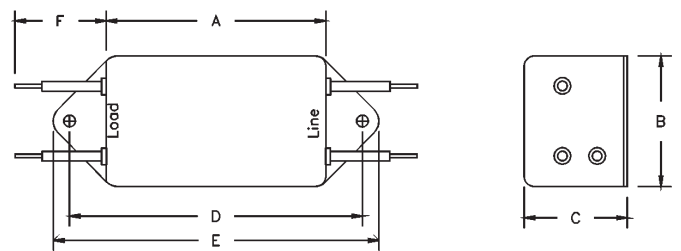
.250 tab terminals:	.580 max/14.73
18-gauge wire leads:	4.25 min/107.95
mounting hole:	.188/4.78 (except as noted)

Case Styles

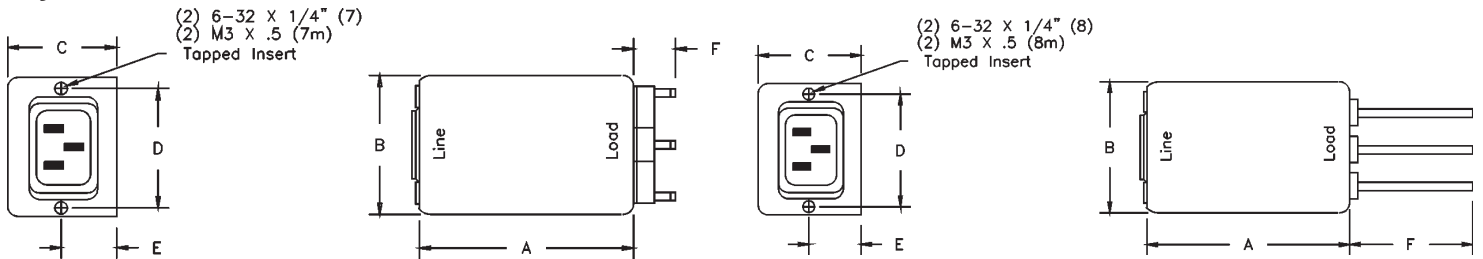
Style 1



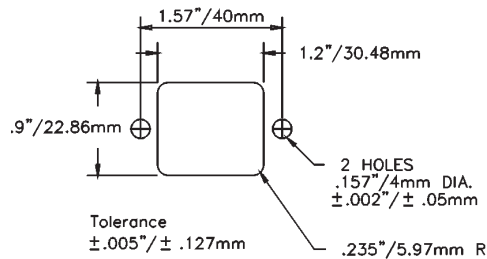
Style 3



Style 7 or 7m



Panel Cutout



STQ Series

Switching Transient Filters

Applications

The STQ series is designed to provide increased attenuation down to 10 kHz. This series provides high attenuation for both common and differential mode interference, with little degradation throughout the frequency range, because of the large peak currents drawn by many switching power supplies.

These filters are for applications which must meet the limits of VDE 0871 from 10 kHz to 30 MHz, as well as FCC Part 18 for ISM equipment.

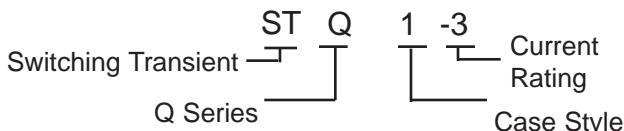
The STQ series meets the leakage requirements of VDE and SEV portable equipment and IEC 2601 (120-volt) nonpatient medical equipment.

Connector Styles (STQ-7 and STQ-8)

This series incorporates the IEC (International Electrotechnical Commission) power line connector with the STQ series filter in one compact package for bulkhead mounting. These filters eliminate the need for installing a separate IEC connector and wiring it to the filter. As a result, the cost of the finished product is lowered and performance is increased.



How to Order



Specifications

Voltage rating: 115/250 VAC

Line frequency: 50/60 Hz

Leakage current (line to ground*):

- 2.00 mA maximum at 120 V, 60 Hz for STQ models.
- 0.25 mA maximum at 120 V, 60 Hz for LSTQ models.
- 3.00 mA maximum at 250 V, 50 Hz for STQ models.
- 0.50 mA maximum at 250 V, 50 Hz for LSTQ models.

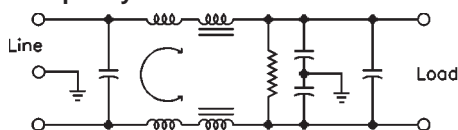
Test Voltage:

- Line to ground, 2250 VDC
- Line to line, 1450 VDC

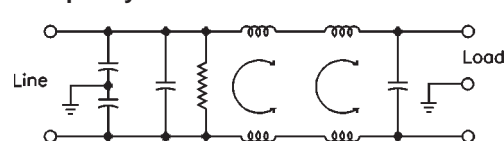
*Low leakage current models may be ordered by using the prefix L on part number, e.g. LSTQ1-3.

Electrical Schematic

3 amp only



6 amp only



Performance

Current Rating	Frequency, MHz									
	.01	.02	.05	.15	.5	1	5	10	30	
Common Mode										
3 amp STQ	22	27	37	50	55	55	55	55	55 (dB)	
3 amp LSTQ	22	27	36	47	47	43	45	45	45 (dB)	
6 amp STQ	28	32	23	72	80	80	80	65	53 (dB)	
6 amp LSTQ	28	32	22	69	72	68	70	55	43 (dB)	
Differential Mode										
3 amp STQ	1	17	42	65	75	75	65	65	65 (dB)	
3 amp LSTQ	1	17	42	65	75	75	65	65	60 (dB)	
6 amp STQ	10	10	48	73	80	80	80	70	75 (dB)	
6 amp LSTQ	10	10	48	73	80	80	80	70	70 (dB)	

Minimum insertion loss in 50-ohm system per MIL-STD-220A.



UL, CSA, and TUV approvals pending.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

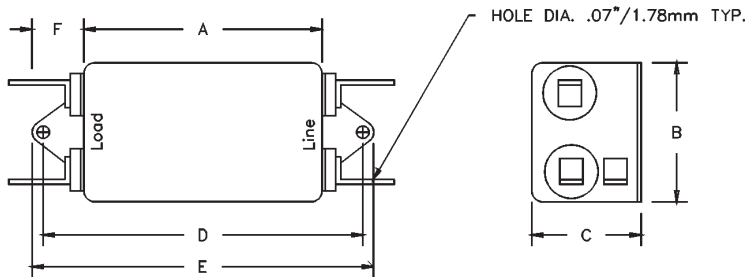
© 2001 SAE Power Inc

Ordering Information

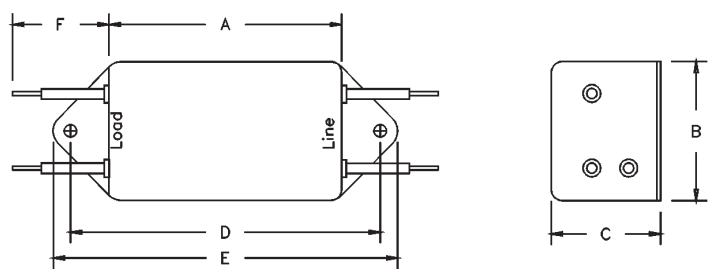
		Dimensions, inches/mm					F Dimensions (typical)	inches/mm
	Part No.	A	B	C	D	E		
3 amp	STQ1-3	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32	.250 tab terminals: 18-gauge wire leads: mounting hole:	.580 max/14.73 4.25 min/107.95 .188/4.78 (except as noted)
	STQ3-3	2.50/63.50	2.00/50.80	1.75/44.45	2.94/74.68	3.32/84.32		
	STQ7-3	3.00/76.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00		
6 amp	STQ8-3	3.00/76.20	2.19/55.63	1.75/44.45	1.57/40.00	0.63/16.00		
	STQ1-6	3.63/92.21	2.25/57.15	1.75/44.45	4.06/103.20	4.47/113.54		
	STQ3-6	3.63/92.21	2.25/57.15	1.75/44.45	4.06/103.20	4.47/113.54		
	STQ7-6	4.40/111.76	2.25/57.15	1.75/44.45	1.57/40.00	0.63/16.00		
	STQ8-6	4.40/111.76	2.25/57.15	1.75/44.45	1.57/40.00	0.63/16.00		

Case Styles

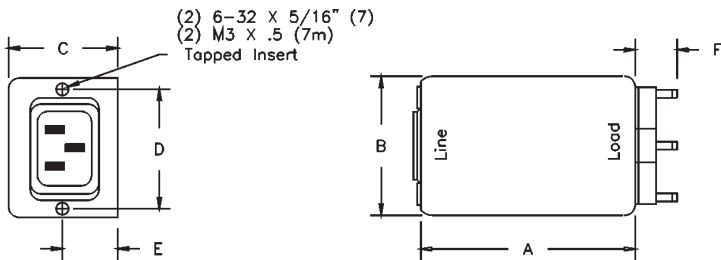
Style 1



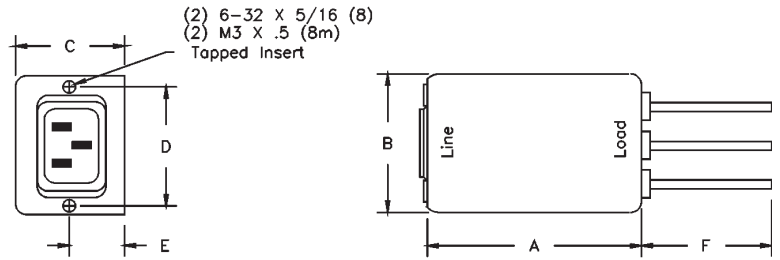
Style 3



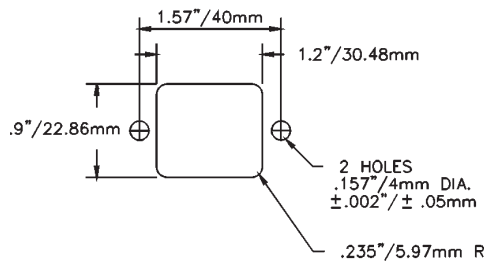
Style 7 or 7m



Style 8 or 8m



Panel Cutout



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

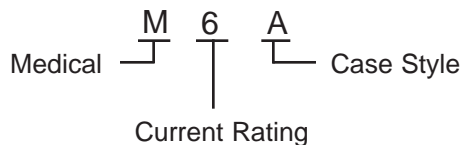
M Series

Medical Filters

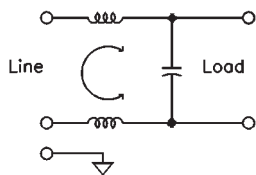
Applications

M series medical filters provide very low leakage current to meet medical and dental equipment requirements of UL 2601 & IEC 601. For non-patient equipment (maximum leakage current of 500 micro amps at 250 VAC) SAE low leakage filters with the prefix "L" may be considered.

How to Order



Electrical Schematic



Specifications

- Voltage rating:** 115/250 VAC
- Line frequency:** 50/60 Hz
- Leakage current (line to ground):**
 2.00 μ A maximum at 115 V, 60 Hz
 5.00 μ A maximum at 250 V, 50 Hz
- Test Voltage:**
 Line to ground, 2250 VDC
 Line to line, 1450 VDC

Performance

Current Rating	Frequency, MHz								
	.15	.2	.50	1	5	10	20	30	
Common Mode									
1 amp M1A, M1B, M1C	15	20	23	25	25	25	20	18	(dB)
3 amp M3A, M3B, M3C	12	17	20	23	25	25	20	18	(dB)
6 amp M6A, M6B, M6C	9	15	20	23	26	25	20	18	(dB)
10 amp M10A, M10B, M10C	10	12	17	20	13	12	10	8	(dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.



These modules are UL recognized, CSA certified, VDE and TUV approved.
 UL File No. E62459.
 CSA File No. LR49272.
 TUV File No. R30001.
 VDE File No. 15890.
 No approvals for 10 amp units.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
 Telephone: (408) 369-2200 Fax: (408) 369-4911
 Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Ordering Information

	Part No.	A	B	C	D
1 amp	M1A*	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00
	M1B*	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00
	M1C	1.77/44.45	0.88/22.35	0.63/16.00	2.13/54.10
3 amp	M3A*	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00
	M3B*	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00
	M3C	1.77/44.45	0.88/22.35	0.63/16.00	2.13/54.10
6 amp	M6A*	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00
	M6B*	1.55/39.37	1.17/29.72	0.81/20.57	1.57/40.00
	M6C	1.77/44.45	0.88/22.35	0.63/16.00	2.13/54.10
10 amp	M10A*	2.00/50.80	1.17/29.72	0.81/20.57	1.57/40.00
	M10B*	2.00/50.80	1.17/29.72	0.81/20.57	1.57/40.00
	M10C	1.75/44.45	1.25/31.75	1.13/28.70	2.13/54.10

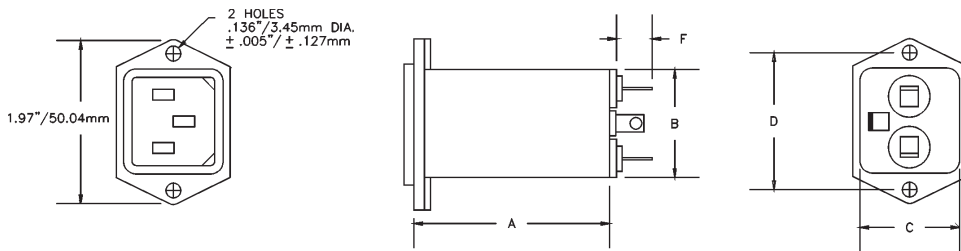
*For small solder lug terminations, add suffix L, e.g., M6AL. For 4 1/4" wire leads replacing terminals, add a W to the end of any part number. For other lengths, consult factory.

F Dimensions (typical)

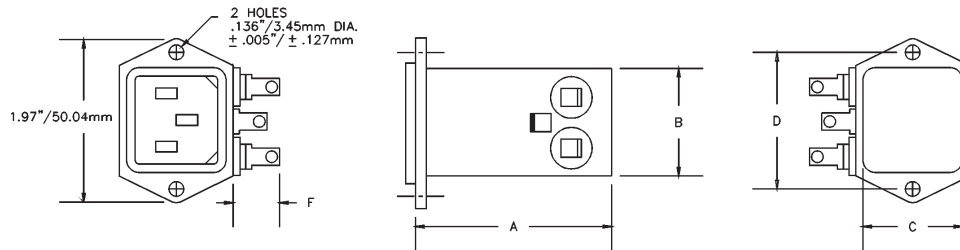
	inches/mm
.250 tab terminals:	.580 max/14.73
solder lug terminals:	.450/11.43
solder lug hole diameter:	.078/1.98
mounting hole:	.188/4.78

Case Styles

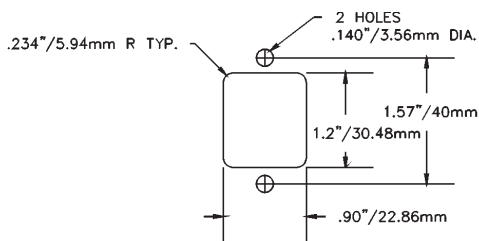
Style A



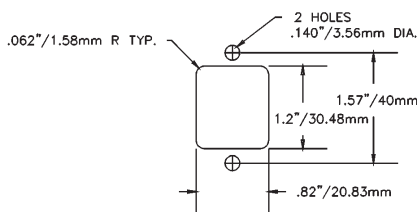
Style B



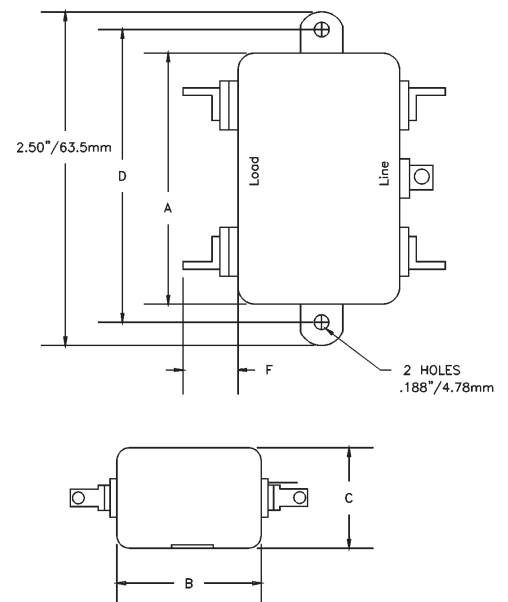
Panel Cutout Typical (Back Mounting)



Panel Cutout (Front Mounting)



Style C



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

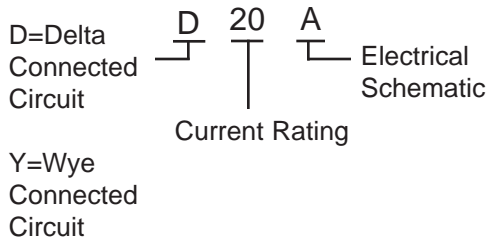
© 2001 SAE Power Inc

3-Phase Filters

Applications

The 3-phase filters are designed to reduce interference in equipment with balanced or unbalanced loads. Wye and delta designs satisfy the connection requirements of these power distribution systems. In addition, L and T circuit configurations are provided for high- and low-impedance loads. A 100 μ H inductor is included in the ground circuit to provide ground current isolation.

How to Order



Specifications

Voltage rating: 250/440 VAC "Y" series

Voltage rating: 250 VAC "D" series

Line frequency: 50/60 Hz

Leakage current (line to ground):

3.00 mA maximum at 115 V, 60 Hz

5.00 mA maximum at 250 V, 50 Hz

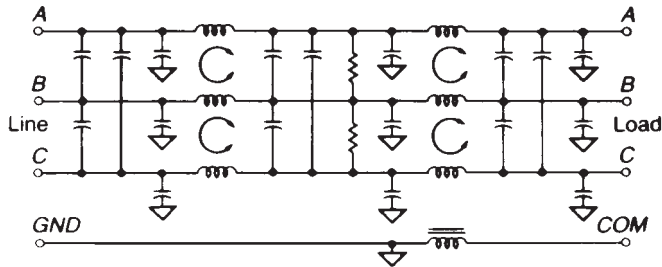
Test Voltage:

Line to ground, 2250 VDC

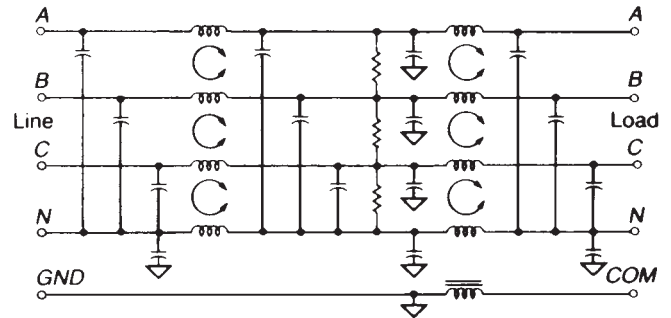
Line to line, 1450 VDC

Electrical Schematics

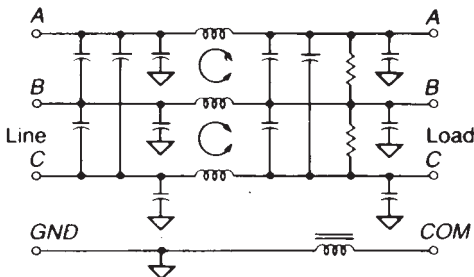
Delta Connected Circuit A



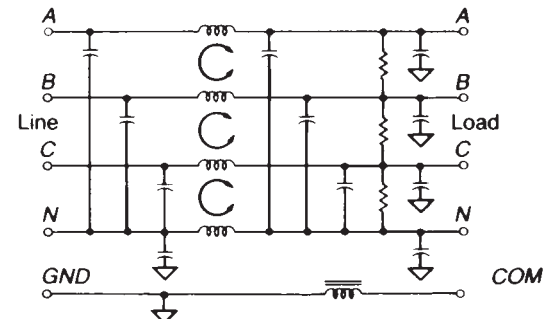
Wye Connected Circuit A



Delta Connected Circuit B



Wye Connected Circuit B



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008

Telephone: (408) 369-2200 Fax: (408) 369-4911

Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Performance

Current Rating		Frequency, MHz				
		.15	.2	.5	10	20
20 amp	D20A	35	43	55	60	50 (dB)
	D20B	20	25	40	45	45 (dB)
	Y20A	35	43	55	55	50 (dB)
	Y20B	20	25	40	45	45 (dB)
30 amp	D30A	20	28	55	60	50 (dB)
	D30B	10	13	28	45	45 (dB)
	Y30A	23	30	55	55	50 (dB)
	Y30B	10	13	28	45	40 (dB)
60 amp	D60A	8	15	40	60	50 (dB)
	D60B	3	6	18	45	40 (dB)
	Y60A	6	12	40	60	50 (dB)
	Y60B	4	7	20	45	40 (dB)

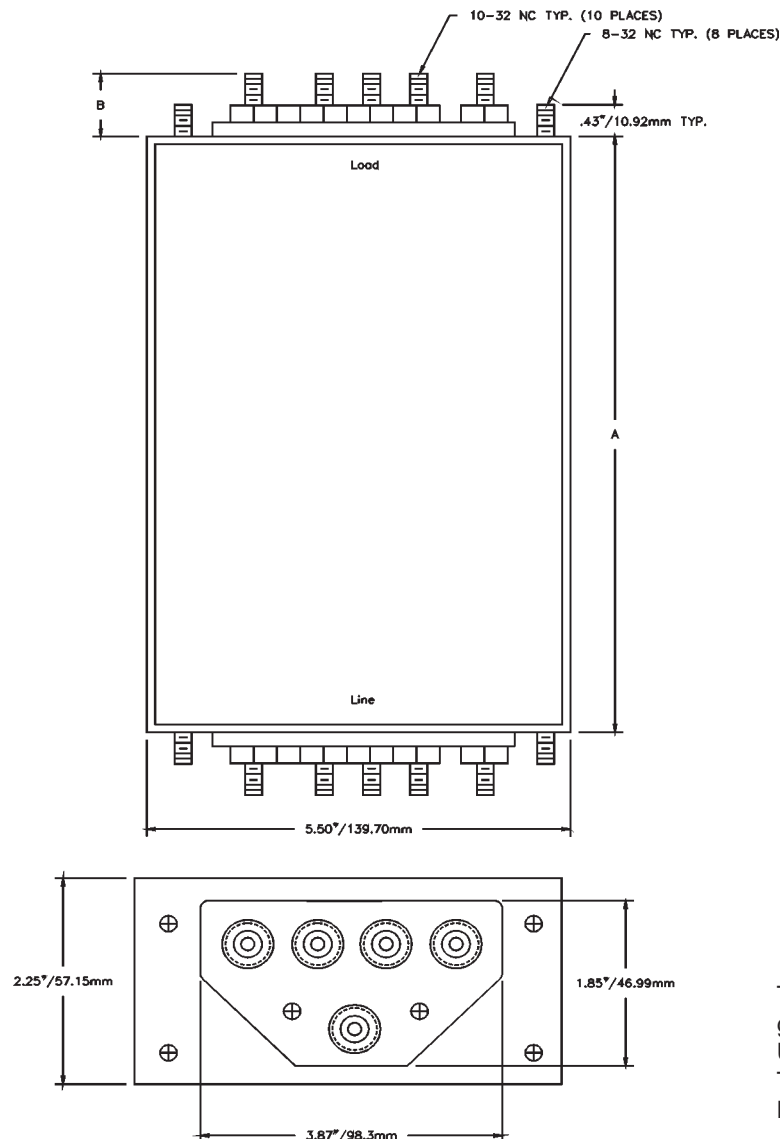
Minimum insertion loss in 50-ohm system per MIL-STD-220A.

Ordering Information

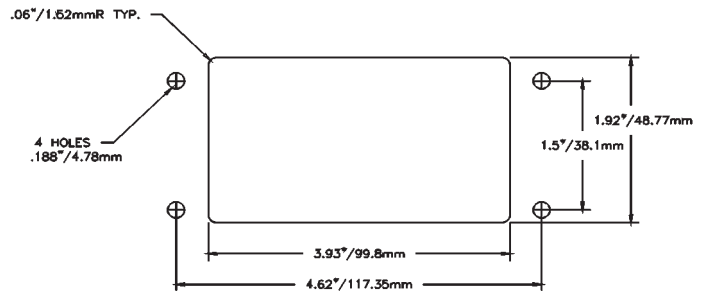
Part No.	Dimensions, inches/mm		
	A	B	
20 amp	D20A	9.50/241.30	0.95/24.13
	D20B	6.50/165.10	0.95/24.13
	Y20A	9.50/241.30	0.95/24.13
	Y20B	6.50/165.10	0.95/24.13
30 amp	D30A	9.50/241.30	0.95/24.13
	D30B	6.50/165.10	0.95/24.13
	Y30A	9.50/241.30	0.95/24.13
	Y30B	6.50/165.10	0.95/24.13
60 amp	D60A	9.50/241.30	0.95/24.13
	D60B	6.50/165.10	0.95/24.13
	Y60A	9.50/241.30	0.95/24.13
	Y60B	6.50/165.10	0.95/24.13

NOTE: Wye circuit filters may be used on 220/440-VAC delta system.
All units may be used on 400-Hz systems.
All mounting studs are 8-32 N.C.

Case Style



Panel Cutout



Torque

Screw Size	Max Torque lb.-in.
6-32	9
8-32	14
10-32	18



These filters are recognized under the components program of Underwriters Laboratories, Inc.
UL File No. E62459 CSA File No. LR49272
TUV File No. R70157
No approval for 60 amp versions.



1500 E. Hamilton Ave. Suite 118, Campbell, CA 95008
Telephone: (408) 369-2200 Fax: (408) 369-4911
Internet: <http://www.saepower.com>

© 2001 SAE Power Inc

Glossary of Terms

Band-Pass Filter-A filter which passes all signals in a specified band and attenuates all signals above or below the cutoff.

Band-Reject Filter-A filter which passes all frequencies except those in a specified band.

BSI (British Standards Institute)-Safety standards.

CISPR (Comite International Special de Perturbation Radioelectriques)-The international body formed to set specific limits, test equipment specifications, test procedures and EMI controls throughout most of the world.

CSA (Canadian Standards Association)-Safety standards.

Decibel (dB)-Appeared originally in acoustic sound measurement applications related to power;

$$\text{dB} = 10 \log \frac{P_1}{P_2} \text{ or } 20 \log \frac{V_1}{V_2}$$

where V_1 or P_1 is input and V_2 or P_2 is output of circuit. Also expressed as

$$\text{dB}\mu\text{A} = 20 \log \frac{\text{conducted } \mu\text{A}}{1\mu\text{A}} \text{ or } \text{dB}\mu\text{V} = 20 \log \frac{\text{conducted } \mu\text{V}}{1\mu\text{V}}$$

EMI/RFI (Electromagnetic and Radio Frequency Interference)-Consists of conducted or radiated electromagnetic emissions that produce an unintentional and unwanted response in electronic equipment or computing devices.

FCC (Federal Communications Commission)-A United States government agency which has the responsibility of controlling the generation of any electrical interference that hampers communication.

High-Pass Filter-A filter which passes signals above a specified cutoff frequency and attenuates all signals below by an increasing amount.

IEC (International Electrotechnical Commission)- A council of the European Community (EC). Has introduced a series of standards, known as IEC1000, relating to susceptibility. To market product in Europe with the CE mark, the IEC1000 standards must be met. Many of SAE Power's ST series filters help the system to meet these requirements.

Insertion Loss-The amount of signal loss at a specified frequency which occurs when passing through an EMI filter network versus no filter, expressed in decibels (dB).

LCIE (France)-Safety standards.

LISN (Line-impedance Stabilization Network) Simulates the standardized impedance of a typical power source. Used in measuring conducted emissions emanating from equipment to power line.

Low-Pass Filter-A filter which passes frequencies from DC to a specified cutoff frequency and attenuates all signals above by an increasing amount. (All SAE filters are low-pass filters.)

Major Causes of EMI (Electromagnetic Interference):

Man Made-Due mostly to motors, power lines and transformers, neon signs, vehicle ignition, citizen band transceivers, and medical and industrial equipment.

Natural Sources-Mostly due to lightning.

Galactic-Originates outside the Earth's atmosphere. Caused by solar flares or novas millions of miles away. This noise is usually found between 18 and 500 MHz.

SEMCO (Sweden)-Safety standards.

SEV (Switzerland)-Safety standards.

TUV (Technischer Uberwachungs Verein) German certified test laboratory authorized by the German Postal Service to qualify systems and components (including EMI filters) for safety standards.

UL (Underwriters Laboratories, Inc.; USA) Safety standards.

VDE (Verband Deutscher Electrotechniker) German certified test laboratory which qualifies or approves equipment and components for commercial and home use throughout most of Europe.

VDE 0871 (German Conducted EMI Specification) - Covers intended RF generation of communications and data processing systems in the range of 10 kHz to 30 MHz.

VDE 0875 (German Conducted EMI Specification) - Covers accidental EMI emissions occurring at 150 kHz and above produced by components or devices operating at frequencies between DC and 10 kHz.

Emissions Testing Laboratory

In order to offer equipment manufacturers a comprehensive range of emission regulation solutions, SAE Power has supplemented its standard catalog and custom filter manufacturing capabilities by offering equipment test laboratory services. Providing testing to the standards of FCC Docket 20780, this service assures the manufacturer of compliance at the system level.

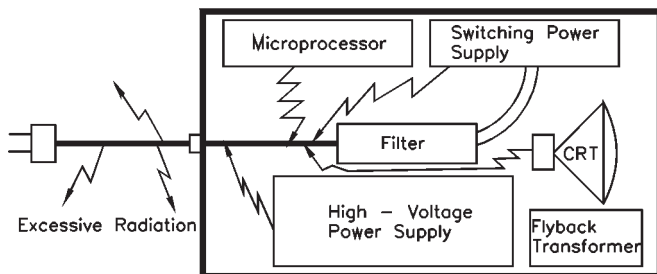
The shielded EMI laboratory responds to the increasing need for a low RF ambient noise environment for the design and the performance measurements of EMI filters. Conducted emission measurements can be performed under controlled conditions to determine interference signal levels and/or compliance with FCC or VDE conducted emission requirements. A shielded environment guarantees that observed signals are emanating from the equipment under test rather than extraneous sources.

The testing lab is a cell-type, solid panel shielded enclosure. RF magnetic integrity is ensured by a magnetic seal door, power input filters, and waveguide below cutoff, ventilation duct air filters.

EMI Filter Application Aid

In Figure 1, the worst-case positioning of an EMI filter is illustrated. The line cord inside the case acts as an antenna. Radiated noise will bypass the filter and appear on a spectrum analyzer as noise being conducted by the system. In many cases, this additional noise will prevent the equipment from passing the required FCC specification.

Figure 1



In Figure 2, when the line cord is placed as close as possible to the input line, the line cord is kept as short as possible. This reduces the amount of internal radiated noise pickup via the power cord. This method produces good results in most cases, but is not the optimum method to use.

Figure 2

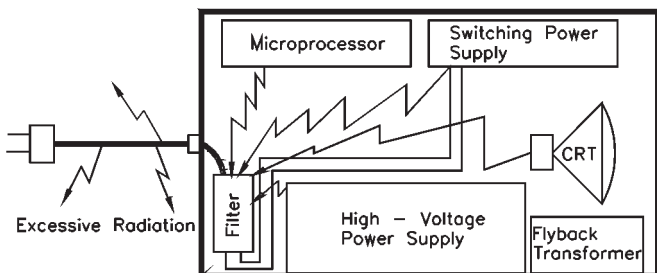
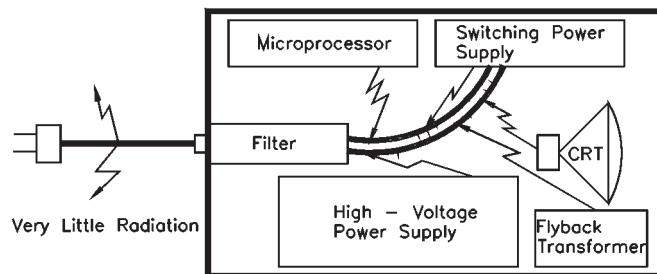


Figure 3 illustrates the most effective positioning method to use. Here, the EMI filter is mounted to the backpanel with input via an IEC connector. This completely eliminates any possible radiation from coupling with the input line. Noise generated internally is picked up by the filter output leads and suppressed via the filter. This method should be used whenever possible.

Figure 3



In summary, the filters used in Figures 1 and 2 may become larger and more expensive than necessary to meet FCC/VDE suppression requirements. The filter used in Figure 3 with an IEC connector as part of the case will generally result in both size and cost reduction through the elimination of noise pickup by that portion of the lead wire exposed within the case itself.