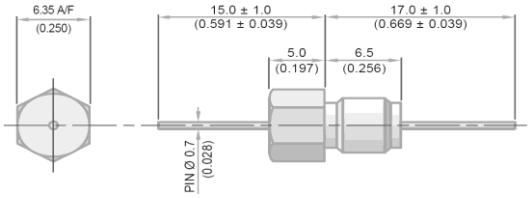
Filter Type
SFCM

Feedthrough EMI Filter Datasheet

(M5 Thread : 6.35mm Hexagonal Head)

Circuit Configurations Available

Dimensions mm (inches)



Thread M5 × 0.8 – 6g

Electrical Details	
Electrical Configuration	C Filter
Capacitance Measurement	@ 1000hr Point
Current Rating	10A
Insulation Resistance (IR)	10GΩ or 1000ΩF
Temperature Rating	-55°C to +125°C
Ferrite Inductance (Typical)	See relevant tables
Mechanical Details	
Head A/F	6.35mm *(0.250")*
Nut A/F	6.0mm *(0.236")*
Washer Diameter	9.1mm *(0.358")*
Mounting Torque	0.6Nm *(5.31lbf in)* if using nut 0.3Nm *(2.65lbf in)* into tapped hole
Mounting Hole Diameter	5.2mm ± 0.1 *(0.205" ± 0.004")*
Max. Panel Thickness	3.4mm *(0.134")*
Weight (Typical)	1.8g *(0.06oz)*
Finish	Silver plate on copper undercoat

C Configuration

						Typical Insertion Loss (db)					
Product Code	Hardware (Nuts & Washers etc.)	Capacitance ± 20% UOS	Dielectric	Rated Voltage (dc)	DWV (dc)	0.01MHz	0.1MHz	1MHz	10MHz	100MHz	1GHz
*SFCMC5000100ZC	0 = No hardware supplied 1 = supplied with standard nut and wavy washer Other options available – please contact factory	10pF -20% / +80%	C0G	500#	750						4
SFCMC5000150ZC		15pF -20% / +80%	C0G	500#	750						7
SFCMC5000220ZC		22pF -20% / +80%	C0G	500#	750						10
SFCMC5000330ZC		33pF -20% / +80%	C0G	500#	750						12
*SFCMC5000470ZC		47pF -20% / +80%	C0G	500#	750					1	15
*SFCMC5000680MC		68pF	C0G	500#	750					2	18
*SFCMC5000101MC		100pF	C0G	500#	750					4	22
SFCMC5000151MC		150pF	C0G	500#	750					7	25
*SFCMC5000221MC		220pF	C0G	500#	750					10	29
*SFCMC5000331MC		330pF	C0G	500#	750					13	33
*SFCMC5000471MX		470pF	† X7R	500#	750				1	16	35
SFCMC5000681MX		680pF	† X7R	500#	750				2	19	36
*SFCMC5000102MX		1.0nF	X7R	500#	750				4	23	41
SFCMC5000152MX		1.5nF	X7R	500#	750				7	26	45
*SFCMC5000222MX		2.2nF	X7R	500#	750				10	30	50
SFCMC5000332MX		3.3nF	X7R	500#	750				13	33	52
*SFCMC5000472MX		4.7nF	X7R	500#	750			1	16	36	55
SFCMC5000682MX		6.8nF	X7R	500#	750			2	19	39	57
*SFCMC5000103MX		10nF	X7R	500#	750			4	22	41	60
*SFCMC5000153MX		15nF	X7R	500#	750			7	25	44	62
*SFCMC5000223MX		22nF	X7R	500#	750			10	29	46	65
SFCMC5000333MX		33nF	X7R	500#	750			13	33	48	68
*SFCMC5000473MX		47nF	X7R	500#	750		1	16	35	50	70
SFCMC5000683MX		68nF	X7R	500#	750		2	19	39	54	>70
SFCMC5000104MX		100nF	X7R	500#	750		4	22	41	57	>70
SFCMC5000154MX		150nF	X7R	500#	750		7	25	45	60	>70
*SFCMC2000224MX		220nF	X7R	200	500		10	29	49	62	>70
SFCMC1000334MX		330nF	X7R	100	250		13	33	52	66	>70
*SFCMC1000474MX		470nF	X7R	100	250	1	16	35	55	68	>70
SFCMC0500684MX		680nF	X7R	50	125	2	19	38	58	70	>70

- Also rated for operation at 115Vac 400Hz. Self-heating will occur – evaluation in situ recommended
* Recommended values † Also available in C0G

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L-C Configuration

Ferrite Inductance (Typical) – 500nH						Typical Insertion Loss (dB)					
Product Code	Hardware	Capacitance ± 20% UOS	Dielectric	Rated Voltage (dc)	DWV (dc)	0.01MHz	0.1MHz	1MHz	10MHz	100MHz	1GHz
*SFCML5000100ZC	0 = No hardware supplied 1 = supplied with standard nut and wavy washer Other options available – please contact factory	10pF -20% / +80%	C0G	500#	750						6
SFCML5000150ZC		15pF -20% / +80%	C0G	500#	750						9
SFCML5000220ZC		22pF -20% / +80%	C0G	500#	750						12
SFCML5000330ZC		33pF -20% / +80%	C0G	500#	750					1	15
*SFCML5000470ZC		47pF -20% / +80%	C0G	500#	750					2	19
*SFCML5000680MC		68pF	C0G	500#	750					4	20
*SFCML5000101MC		100pF	C0G	500#	750					7	24
SFCML5000151MC		150pF	C0G	500#	750					10	27
*SFCML5000221MC		220pF	C0G	500#	750					12	30
*SFCML5000331MC		330pF	C0G	500#	750				1	16	34
*SFCML5000471MX		470pF	† X7R	500#	750				2	19	38
SFCML5000681MX		680pF	† X7R	500#	750				3	22	41
*SFCML5000102MX		1.0nF	X7R	500#	750				6	25	44
SFCML5000152MX		1.5nF	X7R	500#	750				9	29	48
*SFCML5000222MX		2.2nF	X7R	500#	750				12	31	51
SFCML5000332MX		3.3nF	X7R	500#	750				15	35	54
*SFCML5000472MX		4.7nF	X7R	500#	750			1	18	39	57
SFCML5000682MX		6.8nF	X7R	500#	750			2	21	41	60
*SFCML5000103MX		10nF	X7R	500#	750			4	23	43	63
*SFCML5000153MX		15nF	X7R	500#	750			7	27	46	66
*SFCML5000223MX		22nF	X7R	500#	750			10	30	48	68
SFCML5000333MX		33nF	X7R	500#	750			13	34	50	70
*SFCML5000473MX		47nF	X7R	500#	750		1	17	37	51	>70
SFCML5000683MX		68nF	X7R	500#	750		2	20	40	55	>70
*SFCML5000104MX		100nF	X7R	500#	750		4	22	44	60	>70
SFCML5000154MX		150nF	X7R	500#	750		7	25	47	62	>70
*SFCML2000224MX		220nF	X7R	200	500		10	29	49	66	>70
SFCML1000334MX		330nF	X7R	100	250		13	33	53	68	>70
*SFCML1000474MX		470nF	X7R	100	250	1	16	35	56	>70	>70
SFCML0500684MX		680nF	X7R	50	125	2	19	38	58	>70	>70

- Also rated for operation at 115Vac 400Hz. Self-heating will occur – evaluation in situ recommended

* Recommended values

† Also available in C0G

Ordering Information

Type	Case Style	Thread	Electrical configuration	Voltage (dc)	Capacitance in picofarads (pF)	Capacitance Tolerance	Dielectric	Hardware
SF	**C**	**M**	**C**	**500**	**0102**	**M**	**X**	**0**
Syfer Filter	6.35mm A/F	M5	C = C Filter L = L-C Filter	050 = 50V 100 = 100V 200 = 200V 500 = 500V	First digit is 0. Second and third digits are significant figures of capacitance code. The fourth digit is the number of zeros following. Examples: 0101 = 100pF 0332 = 3300pF	M = ± 20% Z = -20%+80%	C = C0G/NP0 X = X7R	0 = Without 1 = With

Note: The addition of a 4-digit numerical suffix code can be used to denote changes to the standard part.

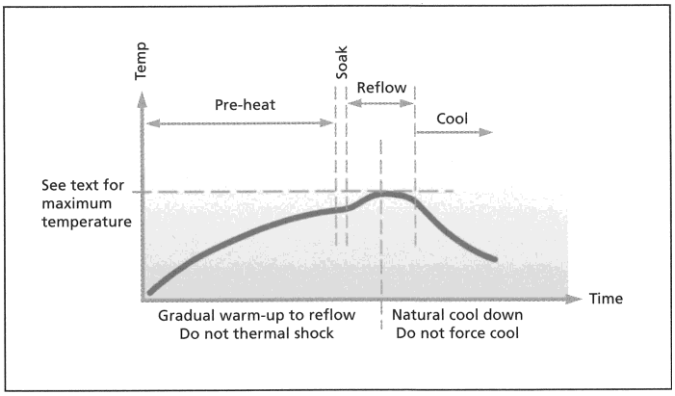
Options include for example: change of pin length / custom body dimensions or threads / alternative voltage rating / non-standard intermediate capacitance values / test requirements.

Please refer specific requests to the factory.

Surface Mount and Panel Mount Solder-in filters

Solder pad layouts are included with the detailed information **for each part.**

Recommended soldering profile



Soldering of filters

The soldering process should be controlled such that the filter does not experience any thermal shocks which may induce thermal cracks in the ceramic dielectric.

The pre-heat temperature rise of the filter should be kept to around 2°C per second. In practice successful temperature rises tend to be in the region of 1.5°C to 4°C per second dependent upon substrate and components.

The introduction of a soak after pre-heat can be useful as it allows temperature uniformity to be established across the substrate thus preventing substrate warping. The magnitude or direction of any warping may change on cooling imposing damaging stresses upon the filter.

E01, E03, E07 SBSP ranges are compatible with all standard solder types including lead-free, maximum temperature 260°C. For SBSG, SBSM and SFSS ranges, solder time should be minimised, and the temperature controlled to a maximum of 220°C. For SFSR, SFST and SFSU ranges the maximum temperature is 250°C.

Cooling to ambient temperature should be allowed to occur naturally. Natural cooling allows a gradual relaxation of thermal mismatch stresses in the solder joints. Draughts should be avoided. Forced air cooling can induce thermal breakage, and cleaning with cold fluids immediately after a soldering process may result in cracked filters.

Note: The use of FlexiCap™ terminations is strongly recommended to reduce the risk of mechanical cracking.

Soldering to axial wire leads

Soldering temperature

The tip temperature of the iron should not exceed 300°C.

Dwell time

Dwell time should be 3-5 seconds maximum to minimise the risk of cracking the capacitor due to thermal shock.

Heat sink

Where possible, a heat sink should be used between the solder joint and the body, especially if longer dwell times are required.

Bending or cropping of wire leads

Bending or cropping of the filter terminations should not be carried out within 4mm (0.157”) of the epoxy encapsulation, the wire should be supported when cropping.

Soldering irons should not be used for mounting surface mount filters as they can result in thermal shock damage to the chip capacitor.

A more comprehensive application note covering installation of all Syfer products is available on the Syfer website.

Resin filled screw mounted EMI filters

General

The ceramic capacitor, which is the heart of the filter, can be damaged by thermal and mechanical shock, as well as by over-voltage. Care should be taken to minimise the risk of stress when mounting the filter to a panel and when soldering wire to the filter terminations.

Mounting to chassis

Mounting torque

It is important to mount the filter to the bulkhead or panel using the recommended mounting torque, otherwise damage may be caused to the capacitor due to distortion of the case. When a threaded hole is to be utilised, the maximum mounting torque should be 50% of the specified figure which relates to unthreaded holes. For details of torque figures for each filter range, please see below.

	Torque (max.)	
Thread	With nut	Into tapped hole
M2.5 & 4-40 UNC	-	0.15Nm (1.32lbf in)
M3	0.25Nm (2.21lbf in)	0.15Nm (1.32lbf in)
6-32 UNC	0.3Nm (2.65lbf in)	0.15Nm (1.32lbf in)
M3.5	0.35Nm (3.09lbf in)	0.18Nm (1.59lbf in)
M4 & 8-32 UNC	0.5Nm (4.42lbf in)	0.25Nm (2.21lbf in)
M5, 12-32 UNEF & 2BA	0.6Nm (5.31lbf in)	0.3Nm (2.65lbf in)
M6 & 1/4-28 UNF	0.9Nm (7.97lbf in)	-

Tools

Hexagonal devices should be assembled using a suitable socket. Round bodied filters may be fitted to the panel in one of two ways (and should not be fitted using pliers or other similar tools which may damage them):

- Round bodies with slotted tops are designed to be screwed in using a simple purpose-designed tool.
- Round bodies without slotted tops are intended to be inserted into slotted holes and retained with a nut.

Grounding

To ensure the proper operation of the filters, the filter body should be adequately grounded to the panel to allow an effective path for the interference. The use of locking adhesives is not recommended, but if used should be applied after the filter has been fitted.

Minimum plate thickness

Users should be aware that the majority of these filters have an undercut between the thread and the mounting flange of the body, equal to 1.5 x the pitch of the thread. Mounting into a panel thinner than this undercut length may result in problems with thread mating and filter position. It is recommended that a panel thicker than this undercut length be used wherever possible.

Maximum plate thickness

This is specified for each filter in order that the nut can be fully engaged even when using a washer.

Soldering to axial wire leads

Soldering temperature

The tip temperature of the iron should not exceed 300°C.

Dwell time

Dwell time should be 3-5 seconds maximum to minimise the risk of cracking the capacitor due to thermal shock.

Heat sink

Where possible, a heat sink should be used between the solder joint and the body, especially if longer dwell times are required.

Bending or cropping of wire leads

Bending or cropping of the filter terminations should not be carried out within 4mm (0.157”) of the epoxy encapsulation, the wire should be supported when cropping.

RoHS compliance

All surface mount filters, resin sealed panel mount filters and power filters are fully RoHS compliant through material exemption, although care must be taken not to exceed the maximum soldering temperatures of surface mount parts.

Standard hermetic sealed panel mount filters use SnPb solders as part of their assembly, and are intended for exempt applications such as aerospace or military. Substitution of the SnPb solder with Pb free solders is possible to create a RoHS compliant part – please contact factory for further details.