

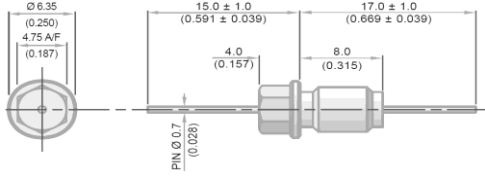
# Feedthrough EMI Filter Datasheet

(12-32 UNEF Tread : 4.75mm Hexagonal Head)

## Circuit Configurations Available



Dimensions mm (inches)



12-32 UNEF Class 2A Thread

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	
Body Flange Diameter	6.35mm (0.250")
Head A/F	4.75mm (0.187")
Nut A/F	7.92mm (0.312")
Washer Diameter	11.35mm (0.447")
Mounting Torque	0.6Nm (5.31lbf in) max. if using nut 0.3Nm (2.65lbf in) max. into tapped hole
Mounting Hole Diameter	5.7mm ± 0.1 (0.224" ± 0.004")
Max. Panel Thickness	4.9mm (0.193")
Weight (Typical)	1.5g (0.05oz)
Finish	Silver plate on copper undercoat

## C Configuration

Product Code	Hardware (Nuts & Washers etc.)	Capacitance ± 20% UOS	Dielectric	Rated Voltage (dc)	DWV (dc)	Typical Insertion Loss (db)						
						0.01MHz	0.1MHz	1MHz	10MHz	100MHz	1GHz	
*SFBDC5000100ZC	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	
SFBDC5000150ZC		15pF -20% / +80%	C0G	500#	750						7	
SFBDC5000220ZC		22pF -20% / +80%	C0G	500#	750						10	
SFBDC5000330ZC		33pF -20% / +80%	C0G	500#	750						12	
*SFBDC5000470ZC		47pF -20% / +80%	C0G	500#	750					1	15	
*SFBDC5000680MC		68pF	C0G	500#	750					2	18	
*SFBDC5000101MC		100pF	C0G	500#	750					4	22	
SFBDC5000151MC		150pF	C0G	500#	750					7	25	
*SFBDC5000221MC		220pF	C0G	500#	750					10	29	
*SFBDC5000331MC		330pF	C0G	500#	750					13	33	
*SFBDC5000471MX		470pF	† X7R	500#	750				1	16	35	
SFBDC5000681MX		680pF	† X7R	500#	750				2	19	36	
*SFBDC5000102MX		1.0nF	X7R	500#	750				4	23	41	
SFBDC5000152MX		1.5nF	X7R	500#	750				7	26	45	
*SFBDC5000222MX		2.2nF	X7R	500#	750				10	30	50	
SFBDC5000332MX		3.3nF	X7R	500#	750				13	33	52	
*SFBDC5000472MX		4.7nF	X7R	500#	750				1	16	36	55
SFBDC5000682MX		6.8nF	X7R	500#	750				2	19	39	57
*SFBDC5000103MX		10nF	X7R	500#	750				4	22	41	60
*SFBDC5000153MX		15nF	X7R	500#	750				7	25	44	62
*SFBDC5000223MX	22nF	X7R	500#	750				10	29	46	65	
SFBDC5000333MX	33nF	X7R	500#	750				13	33	48	68	
*SFBDC2000473MX	47nF	X7R	200	500			1	16	35	50	70	
SFBDC2000683MX	68nF	X7R	200	500			2	19	39	54	>70	
*SFBDC1000104MX	100nF	X7R	100	250			4	22	41	57	>70	
*SFBDC0500154MX	150nF	X7R	50	125			7	25	45	60	>70	

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



## 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	1 MHz	10MHz	100MHz	1GHz
*SFBDL5000100ZC	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
SFBDL5000150ZC		15pF -20% / +80%	C0G	500#	750						9
SFBDL5000220ZC		22pF -20% / +80%	C0G	500#	750						12
SFBDL5000330ZC		33pF -20% / +80%	C0G	500#	750					1	15
*SFBDL5000470ZC		47pF -20% / +80%	C0G	500#	750					2	19
*SFBDL5000680MC		68pF	C0G	500#	750					4	20
*SFBDL5000101MC		100pF	C0G	500#	750					7	24
SFBDL5000151MC		150pF	C0G	500#	750					10	27
*SFBDL5000221MC		220pF	C0G	500#	750					12	30
*SFBDL5000331MC		330pF	C0G	500#	750				1	16	34
*SFBDL5000471MX		470pF	† X7R	500#	750				2	19	38
SFBDL5000681MX		680pF	† X7R	500#	750				3	22	41
*SFBDL5000102MX		1.0nF	X7R	500#	750				6	25	44
SFBDL5000152MX		1.5nF	X7R	500#	750				9	29	48
*SFBDL5000222MX		2.2nF	X7R	500#	750				12	31	51
SFBDL5000332MX		3.3nF	X7R	500#	750				15	35	54
*SFBDL5000472MX		4.7nF	X7R	500#	750			1	18	39	57
SFBDL5000682MX		6.8nF	X7R	500#	750			2	21	41	60
*SFBDL5000103MX		10nF	X7R	500#	750			4	23	43	63
*SFBDL5000153MX		15nF	X7R	500#	750			7	27	46	66
*SFBDL5000223MX		22nF	X7R	500#	750			10	30	48	68
SFBDL5000333MX		33nF	X7R	500#	750			13	34	50	70
*SFBDL2000473MX		47nF	X7R	200	500		1	17	37	51	>70
SFBDL2000683MX		68nF	X7R	200	500		2	20	40	55	>70
SFBDL1000104MX		100nF	X7R	100	250		4	22	44	60	>70
SFBDL0500154MX		150nF	X7R	50	125		7	25	47	62	>70

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

## Pi Configuration

Ferrite Inductance (Typical) – 250nH						Typical Insertion Loss (db)						
Product Code	Hardware (Nuts & Washers etc.)	Capacitance (-20%+80%)	Dielectric	Rated Voltage (dc)	DWV (dc)	0.01MHz	0.1MHz	1MHz	10MHz	100MHz	1GHz	
*SFBDP5000200ZC	0 = No hardware supplied 1 = supplied with standard nut and wavy washer Other options available – please contact factory	20pF	C0G	500#	750					1	11	
SFBDP5000300ZC		30pF	C0G	500#	750					2	15	
SFBDP5000440ZC		44pF	C0G	500#	750					3	19	
SFBDP5000660ZC		66pF	C0G	500#	750					4	23	
*SFBDP5000940ZC		94pF	C0G	500#	750					6	29	
*SFBDP5000136MC		136pF	C0G	500#	750					8	35	
*SFBDP5000201MC		200pF	C0G	500#	750					11	41	
SFBDP5000301MC		300pF	C0G	500#	750				1	15	50	
*SFBDP5000441MC		440pF	C0G	500#	750				2	20	57	
*SFBDP5000661MC		660pF	C0G	500#	750				3	25	65	
*SFBDP5000941MX		940pF	†X7R	500#	750				5	31	68	
SFBDP5001N36MX		1.36nF	†X7R	500#	750				7	37	>70	
*SFBDP5000202MX		2nF	X7R	500#	750				10	44	>70	
SFBDP5000302MX		3nF	X7R	500#	750				13	51	>70	
*SFBDP5000442MX		4.4nF	X7R	500#	750			1	17	59	>70	
SFBDP5000662MX		6.6nF	X7R	500#	750			2	21	64	>70	
*SFBDP5000942MX		9.4nF	X7R	500#	750			4	27	68	>70	
SFBDP50013N6MX		13.6nF	X7R	500#	750			6	34	>70	>70	
*SFBDP5000203MX		20nF	X7R	500#	750			9	40	>70	>70	
*SFBDP5000303MX		30nF	X7R	500#	750			12	48	>70	>70	
*SFBDP5000443MX		44nF	X7R	500#	750			1	14	54	>70	>70
SFBDP5000663MX		66nF	X7R	500#	750			2	17	63	>70	>70
*SFBDP2000943MX		94nF	X7R	200	500			4	18	68	>70	>70
SFBDP200136NMX		136nF	X7R	200	500			8	25	>70	>70	>70
*SFBDP1000204MX		200nF	X7R	100	250			10	27	>70	>70	>70
*SFBDP0500304MX		300nF	X7R	50	125			13	30	>70	>70	>70

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

\* Recommended values

† Also available in C0G

## T Configuration

Ferrite Inductance (Typical) – 450nH						Typical Insertion Loss (db)					
Product Code	Hardware	Capacitance ± 20% UOS	Dielectric	Rated Voltage (dc)	DWV (dc)	0.01MHz	0.1MHz	1MHz	10MHz	100MHz	1GHz
*SFBDT5000100ZC	0 = No hardware supplied 1 = supplied with standard nut and wavy washer Other options available – please contact factory	10pF -20% / +80%	C0G	500#	750						9
SFBDT5000150ZC		15pF -20% / +80%	C0G	500#	750						11
SFBDT5000220ZC		22pF -20% / +80%	C0G	500#	750					1	14
SFBDT5000330ZC		33pF -20% / +80%	C0G	500#	750					2	18
*SFBDT5000470ZC		47pF -20% / +80%	C0G	500#	750					4	20
*SFBDT5000680MC		68pF	C0G	500#	750					6	23
*SFBDT5000101MC		100pF	C0G	500#	750					9	27
SFBDT5000151MC		150pF	C0G	500#	750					12	30
*SFBDT5000221MC		220pF	C0G	500#	750					15	33
*SFBDT5000331MC		330pF	C0G	500#	750				1	19	36
*SFBDT5000471MX		470pF	† X7R	500#	750				2	21	40
SFBDT5000681MX		680pF	† X7R	500#	750				4	24	43
*SFBDT5000102MX		1.0nF	X7R	500#	750				7	28	47
SFBDT5000152MX		1.5nF	X7R	500#	750				10	30	50
*SFBDT5000222MX		2.2nF	X7R	500#	750				13	34	53
SFBDT5000332MX		3.3nF	X7R	500#	750				17	38	57
*SFBDT5000472MX		4.7nF	X7R	500#	750				19	40	59
SFBDT5000682MX		6.8nF	X7R	500#	750			1	23	43	63
*SFBDT5000103MX		10nF	X7R	500#	750			4	26	45	66
*SFBDT5000153MX		15nF	X7R	500#	750			7	29	47	68
*SFBDT5000223MX		22nF	X7R	500#	750			10	33	49	70
SFBDT5000333MX		33nF	X7R	500#	750			14	36	50	>70
*SFBDT2000473MX		47nF	X7R	200	500		1	17	39	52	>70
SFBDT2000683MX		68nF	X7R	200	500		2	20	42	57	>70
*SFBDT1000104MX		100nF	X7R	100	250		4	22	46	62	>70
*SFBDT0500154MX		150nF	X7R	50	125		7	25	49	68	>70

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

## Ordering Information

Type	Case Style	Thread	Electrical configuration	Voltage (dc)	Capacitance in picofarads (pF)	Capacitance Tolerance	Dielectric	Hardware
SF	B	D	C	500	0102	M	X	0
Syfer Filter	4.75mm Hex Head	12-32 UNEF	C = C Filter L = L-C Filter P = Pi Filter T = T 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 = COG/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.

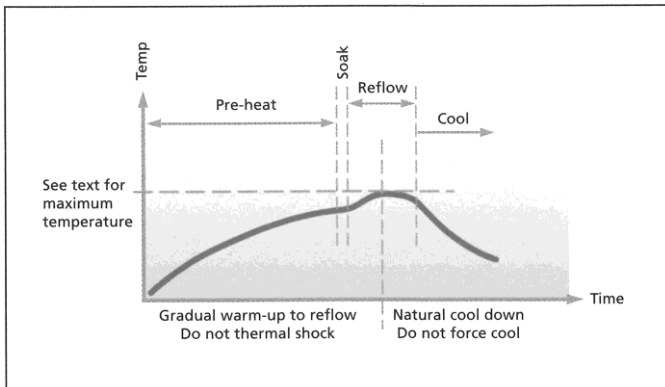
Options include for example: change of pin length / custom body dimensions or threads / alternative voltage rating / non-standard intermediate capacitance values / test requirements.

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.

Thread	Torque (max.)	
	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.