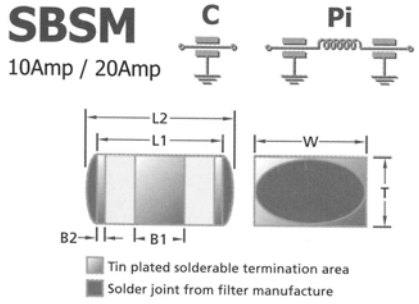
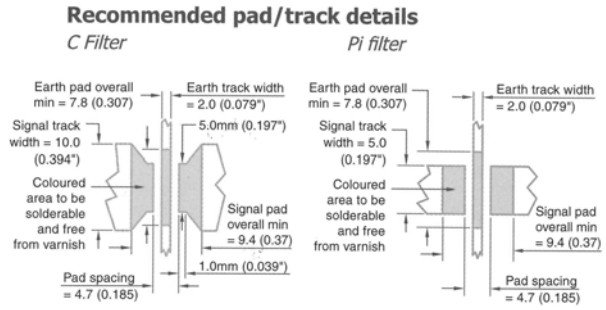
SBSM

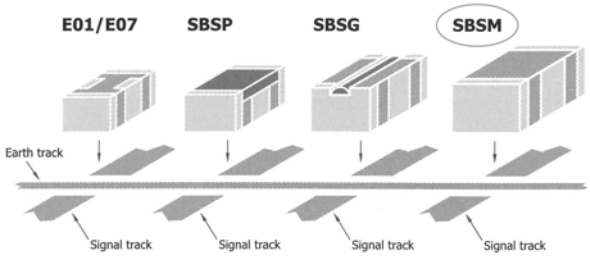
Surface Mount EMI Filters



	2220
L1	5.7 ± 0.4 (0.224 ± 0.015)
L2	6.6 ± 0.4 (0.260 ± 0.015)
W	5.0 ± 0.4 (0.197 ± 0.015)
T	3.18 ± 0.2 (0.125 ± 0.008)
B1	2.25 ± 0.4 (0.088 ± 0.015)
B2	0.30 ± 0.25 (0.012 ± 0.010)



Type		SBSMC	SBSMP
Chip Size		2220	2220
Max Current		20A	10A
Rated Voltage	Dielectric	Minimum and maximum capacitance values	
50Vdc	C0G/NP0	-	-
	X7R	470nF	470nF
100Vdc	C0G/NP0	-	-
	X7R	220nF-330nF	220nF-330nF
200Vdc	C0G/NP0	-	-
	X7R	100nF-150nf	100nF-150nf
500Vdc	C0G/NP0	-	-
	X7R	1nF-68nF	1nF-68nF

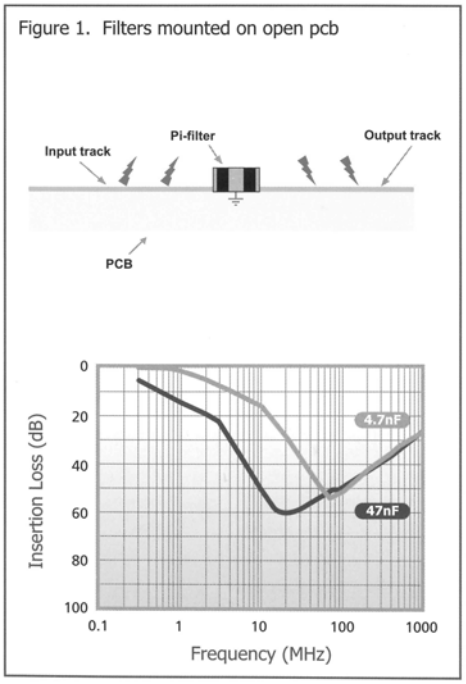


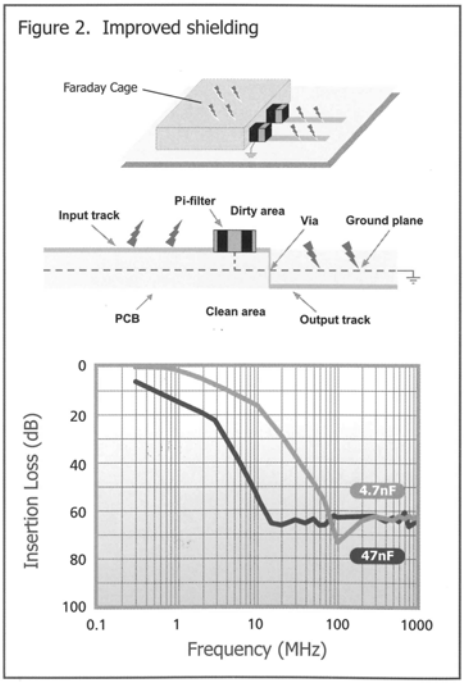
Effects of mounting method on insertion loss

C and Pi filters are mounted to PCBs and soldered in identical manner to chip capacitors. Solder connections made to each end (signal lines) and each side band (earth track).

Whilst SBSG, SBSM and SBSP filters can be mounted conventionally on PCBs, they are also suitable for mounting in a wall or partition on a board. This greatly improves the screening between filter input and output, thereby enhancing the high frequency response.

The following insertion loss curves (for SBSP, SBSG, SBSM Pi filters), based on actual measurements, show the effect. It can be seen that the filters conventionally mounted (Fig. 1) exhibit a drop in attenuation at higher frequencies. Improved shielding methods (Fig. 2), maintain excellent suppression characteristics to 1GHz and above. See below for application example.





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Insertion loss tables for surface mount EMI filters - C filter

Product Code	Packing	Capacitance (±20%)	Dielectric	Rated Voltage (dc)	DWV (dc)	Approximate Resonant Frequency (MHz)	Typical No-Load Insertion Loss (dB)* 0.1MHz	1MHz	10MHz	100MHz	1GHz
SBSMC5000102MX	B = Bulk Packed T = Tape-and-Reel (178mm / 7" reels) R = Tape-and-Reel (330mm / 13" reels)	1.0nF	X7R	500	750	270	0	0	5	24	21
SBSMC5000152MX		1.5nF	X7R	500	750	265	0	0	7	25	21
SBSMC5000222MX		2.2nF	X7R	500	750	235	0	0	11	31	21
SBSMC5000332MX		3.3nF	X7R	500	750	185	0	1	15	35	21
SBSMC5000472MX		4.7nF	X7R	500	750	154	0	2	17	40	21
SBSMC5000682MX		6.8nF	X7R	500	750	125	0	4	21	44	21
SBSMC5000103MX		10nF	X7R	500	750	100	0	5	24	50	21
SBSMC5000153MX		15nF	X7R	500	750	80	0	7	27	43	21
SBSMC5000223MX		22nF	X7R	500	750	65	0	11	31	43	21
SBSMC5000333MX		33nF	X7R	500	750	54	1	15	34	43	21
SBSMC5000473MX		47nF	X7R	500	750	46	2	17	37	43	21
SBSMC5000683MX		68nF	X7R	500	750	39	3	21	41	43	21
SBSMC2000104MX		100nF	X7R	200	500	33	5	24	44	43	21
SBSMC2000154MX		150nF	X7R	200	500	26	7	26	47	43	21
SBSMC1000224MX		220nF	X7R	100	250	21	11	31	52	43	21
SBSMC1000334MX		330nF	X7R	100	250	20	14	33	54	43	21
SBSMC0500474MX		470nF	X7R	50	125	19	17	36	54	43	21

* - Insertion Loss performance quoted is measured on an open board mounted on a brass backplane in a 50Ω system. Performance curves can be supplied on request. Performance in circuit is liable to be different and is affected by board material, track layout, grounding efficiency and circuit impedances. Shielding can be used to improve high frequency performance.

Insertion loss tables for surface mount EMI filters - P filter

Product Code	Packing	Capacitance (±20%)	Dielectric	Rated Voltage (dc)	DWV (dc)	Approximate Resonant Frequency (MHz)	Typical No-Load Insertion Loss (dB)* 0.1MHz	1MHz	10MHz	100MHz	1GHz
SBSMP5000102MX	B = Bulk Packed T = Tape-and-Reel (178mm / 7" reels) R = Tape-and-Reel (330mm / 13" reels)	1.0nF	X7R	500	750	150	0	0	5	34	21
SBSMP5000152MX		1.5nF	X7R	500	750	130	0	0	7	39	21
SBSMP5000222MX		2.2nF	X7R	500	750	100	0	0	11	38	21
SBSMP5000332MX		3.3nF	X7R	500	750	80	0	1	12	44	21
SBSMP5000472MX		4.7nF	X7R	500	750	63	0	2	15	44	21
SBSMP5000682MX		6.8nF	X7R	500	750	55	0	3	18	44	21
SBSMP5000103MX		10nF	X7R	500	750	43	0	5	24	44	21
SBSMP5000153MX		15nF	X7R	500	750	35	0	8	28	44	21
SBSMP5000223MX		22nF	X7R	500	750	30	0	10	35	44	21
SBSMP5000333MX		33nF	X7R	500	750	23	1	12	48	44	21
SBSMP5000473MX		47nF	X7R	500	750	19	2	16	50	44	21
SBSMP5000683MX		68nF	X7R	500	750	15	3	19	55	44	21
SBSMP2000104MX		100nF	X7R	200	500	12	5	21	58	44	21
SBSMP2000154MX		150nF	X7R	200	500	10	8	23	62	44	21
SBSMP1000224MX		220nF	X7R	100	250	8	11	25	63	44	21
SBSMP1000334MX		330nF	X7R	100	250	6	14	22	62	44	21
SBSMP0500474MX		470nF	X7R	50	125	5	16	20	64	44	21

* - Insertion Loss performance quoted is measured on an open board mounted on a brass backplane in a 50Ω system. Performance curves can be supplied on request. Performance in circuit is liable to be different and is affected by board material, track layout, grounding efficiency and circuit impedances. Shielding can be used to improve high frequency performance.

Ordering Information

SBS	M	P	050	0474	M	X	T
Type	**Size**	**Configuration**	**Rated Voltage**	**Capacitance in Pico farads (pF)**	**Tolerance**	**Dielectric**	**Packaging**
Surface mount board filter	**M** = 2220	**C** = C section **P** = Pi Section	050 = 50Vdc 100 = 100Vdc 200 = 200Vdc 500 = 500Vdc	First digit is 0. Second and third digits are significant figures of capacitance code. The fourth digit is number of zeros following. Example: **0471** = 470nF	M = ±20%	X = X7R	T=178mm (7") reel R=330mm (13") reel B = Bulk

Reeled Quantities

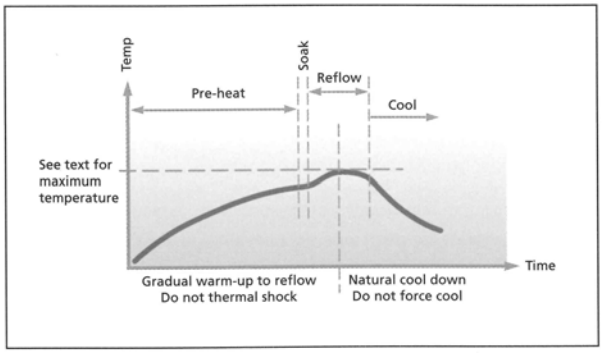
178mm (7") reel	**2220**
	500

330mm (13") reel	**2220**
	2000

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.

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