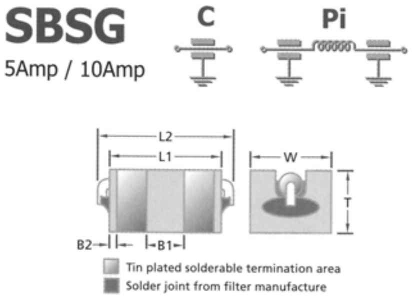
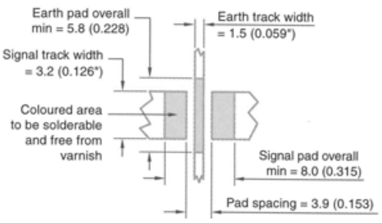
SBSG

Surface Mount EMI Filters

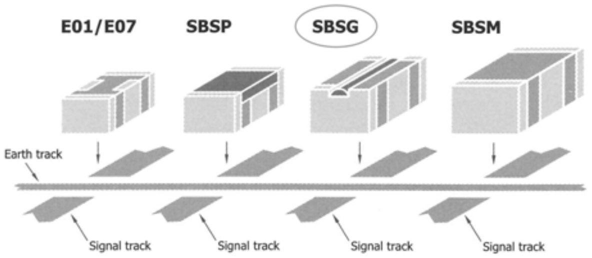


	C	Pi
L1	4.55 ± 0.25 (0.179 ± 0.010)	4.55 ± 0.25 (0.179 ± 0.010)
L2	4.70 ± 0.4 (0.185 ± 0.015)	5.25 ± 0.4 (0.207 ± 0.015)
W	3.20 ± 0.2 (0.126 ± 0.008)	3.20 ± 0.2 (0.126 ± 0.008)
T	2.50 ± 0.15 (0.098 ± 0.006)	2.50 ± 0.15 (0.098 ± 0.006)
B1	1.50 ± 0.4 (0.059 ± 0.015)	1.50 ± 0.4 (0.059 ± 0.015)
B2	0.30 ± 0.25 (0.012 ± 0.010)	0.30 ± 0.25 (0.012 ± 0.010)

Recommended pad/track details



Type		SBSGC	SBSGP
Chip Size		1812	1812
Max Current		10A	5A
Rated Voltage	Dielectric	Minimum and maximum capacitance values	
50Vdc	**C0G/NP0**	-	-
	X7R	220nF	220nF
100Vdc	**C0G/NP0**	-	-
	X7R	100nF-150nF	100nF-150nF
200Vdc	**C0G/NP0**	-	-
	X7R	68nF	68nF
500Vdc	**C0G/NP0**	-	-
	X7R	1nF-47nF	1nF-47nF



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.

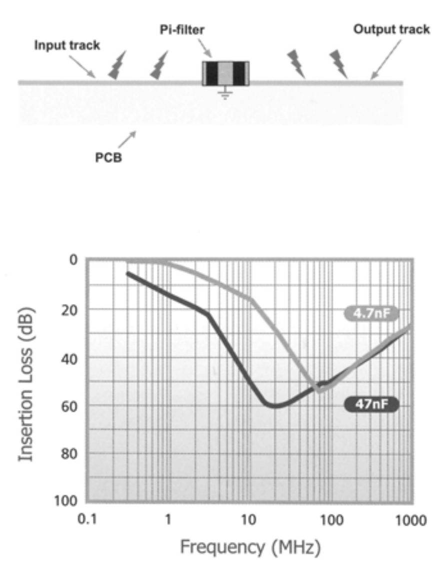


Figure 1. Filters mounted on open pcb

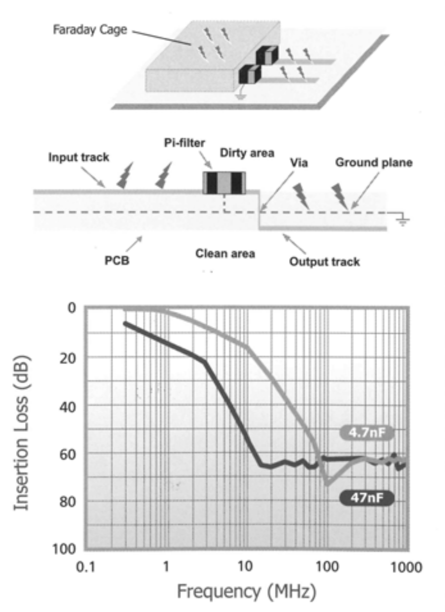


Figure 2. Improved shielding

Insertion loss tables for surface mount EMI filters - C filter

							Typical No-Load Insertion Loss (dB)*				
Product Code	Packing	Capacitance (±20%)	Dielectric	Rated Voltage (dc)	DWV (dc)	Approximate Resonant Frequency (MHz)	0.1MHz	1MHz	10MHz	100MHz	1GHz
SBSGC5000102MX	B = Bulk Packed T = Tape-and-Reel (178mm / 7″ reels) R = Tape-and-Reel (330mm / 13″ reels)	1.0nF	X7R	500	750	186	0	0	5	23	18
SBSGC5000152MX		1.5nF	X7R	500	750	147	0	0	8	27	18
SBSGC5000222MX		2.2nF	X7R	500	750	130	0	0	11	32	18
SBSGC5000332MX		3.3nF	X7R	500	750	110	0	1	14	34	18
SBSGC5000472MX		4.7nF	X7R	500	750	100	0	2	17	40	18
SBSGC5000682MX		6.8nF	X7R	500	750	80	0	4	20	38	18
SBSGC5000103MX		10nF	X7R	500	750	62.5	0	5	24	38	18
SBSGC5000153MX		15nF	X7R	500	750	50	0	8	27	38	18
SBSGC5000223MX		22nF	X7R	500	750	39	0	11	32	39	18
SBSGC5000333MX		33nF	X7R	500	750	33	1	14	34	39	18
SBSGC5000473MX		47nF	X7R	500	750	28	2	17	36	39	18
SBSGC2000683MX		68nF	X7R	200	500	23	3	20	37	39	18
SBSGC1000104MX		100nF	X7R	100	250	19	5	23	41	39	18
SBSGC1000154MX		150nF	X7R	100	250	15.5	8	27	47	39	18
SBSGC0500224MX		220nF	X7R	050	125	13	11	30	49	39	18

* - 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 - Pi filter

							Typical No-Load Insertion Loss (dB)*				
Product Code	Packing	Capacitance (±20%)	Dielectric	Rated Voltage (dc)	DWV (dc)	Approximate Resonant Frequency (MHz)	0.1MHz	1MHz	10MHz	100MHz	1GHz
SBSGP5000102MX	B = Bulk Packed T = Tape-and-Reel (178mm / 7″ reels) R = Tape-and-Reel (330mm / 13″ reels)	1.0nF	X7R	500	750	140	0	0	5	39	18
SBSGP5000152MX		1.5nF	X7R	500	750	100	0	0	8	41	18
SBSGP5000222MX		2.2nF	X7R	500	750	75	0	0	10	39	18
SBSGP5000332MX		3.3nF	X7R	500	750	54	0	1	15	39	18
SBSGP5000472MX		4.7nF	X7R	500	750	44	0	2	17	39	18
SBSGP5000682MX		6.8nF	X7R	500	750	35	0	3	23	39	18
SBSGP5000103MX		10nF	X7R	500	750	28	0	5	28	39	18
SBSGP5000153MX		15nF	X7R	500	750	23	0	8	35	39	18
SBSGP5000223MX		22nF	X7R	500	750	19	0	10	43	39	18
SBSGP5000333MX		33nF	X7R	500	750	15	1	12	46	39	18
SBSGP5000473MX		47nF	X7R	500	750	12	2	14	53	39	18
SBSGP2000683MX		68nF	X7R	200	500	10	3	16	55	39	18
SBSGP1000104MX		100nF	X7R	100	250	7.5	5	17	56	39	18
SBSGP1000154MX		150nF	X7R	100	250	6	8	20	58	39	18
SBSGP0500224MX		220nF	X7R	050	125	5.2	11	25	58	39	18

* - Insertion Loss performance quoted is measured on an open FR4 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	G	P	500	0473	M	X	T
Type	**Size**	**Configuration**	**Rated Voltage**	**Capacitance in Pico farads (pF)**	**Tolerance**	**Dielectric**	**Packaging**
Surface mount board filter	**G** = 1812	**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: **0473** = 47nF	M = ±20%	X = X7R	T=178mm (7") reel R=330mm (13") reel B = Bulk

Reeled Quantities

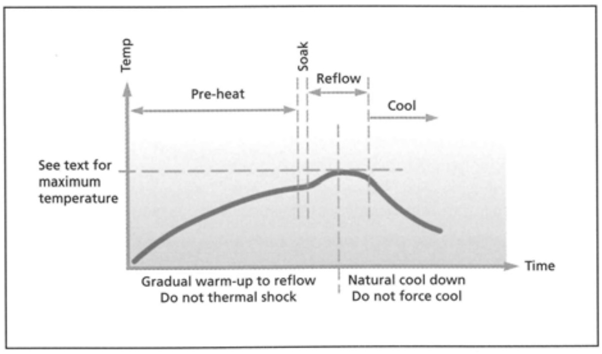
178mm (7") reel	**1812**
	500

330mm (13") reel	**1812**
	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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Syfer:

SBSGP5000223MXT SBSGP0500224MXT SBSGP5000473MXT SBSGP5000103MXT SBSGP1000154MXT
SBSGP2000683MXT SBSGP5000153MXT SBSGP5000222MXT SBSGP5000102MXT SBSGP1000104MXT
SBSGP5000472MXT SBSGP0500224MXB SBSGP1000104MXB SBSGP1000154MXB SBSGP5000223MXB
SBSGP5000332MXT SBSGP5000682MXT SBSGP5000222MXB SBSGP2000683MXB SBSGC5000102MXB
SBSGC1000104MXB SBSGP5000103MXB SBSGP5000472MXB SBSGP5000102MXB SBSGP5000682MXB
SBSGP5000473MXB SBSGC5000473MXB SBSGC0500224MXB