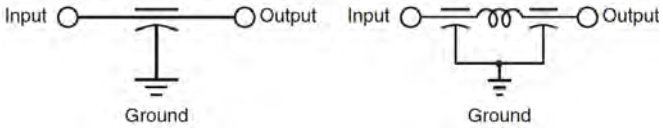
SPECTRUM CONTROL

DATA SHEET

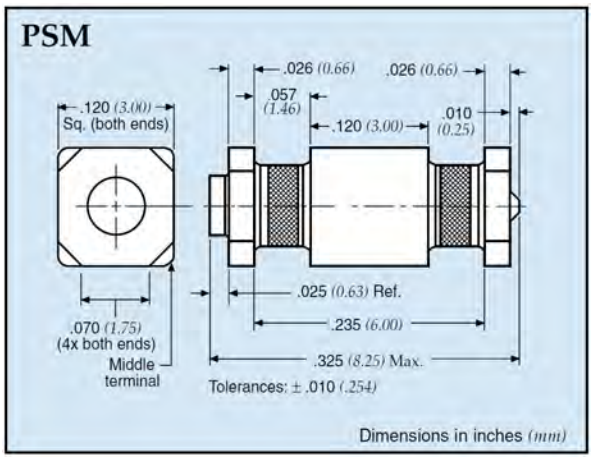
Surface Mount Low Pass Filters

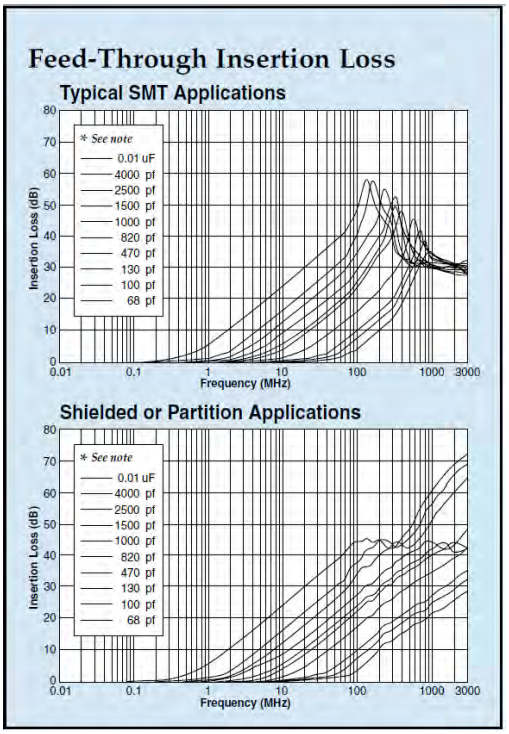
PSM Series

PSM **Feedthrough** **Pi**

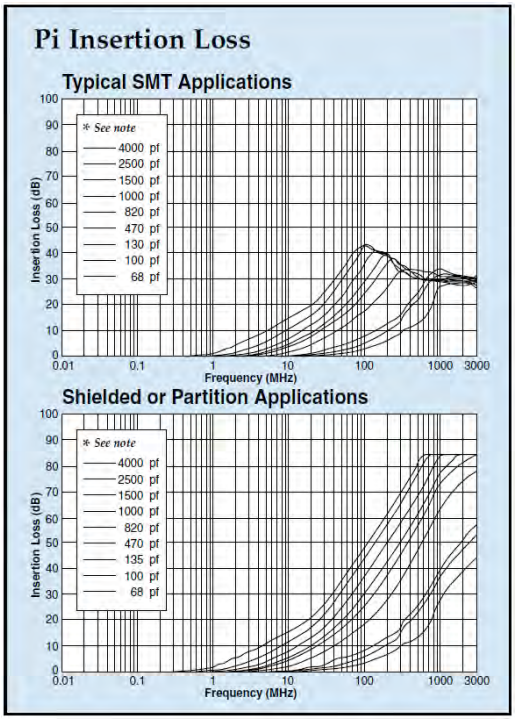


Voltage Rating DC	200 VDC @ -55°C to +125°C
DWV	700 VDC
Current Rating	20 Amps (Feedthrough) max. 10 Amps (Pi) max.
Insulation Resistance	1.0 GΩ @ 25°C
Dissipation Factor	4.0% maximum
D.C.R	Max. .0005Ω, typ. .0002Ω





**** Capacitance values for insertion loss curves are displayed left to right in the order shown.***



SPECTRUM CONTROL

DATA SHEET

Power Surface Mount Filters

PSM Ordering Information

Example: **PSM4-402Z-20T0**

PSM	4	-	402Z	-	20	T	0
Style	Circuit Configuration		Capacitance		Current Rating	Packaging	Tape and Reel

PSM (Power)

1 - Pi
4 - Feedthrough

† Also available through Spectrum Control's authorized distributors.

Code	Value*	Tolerance
680M	68 pF	±20%
101M	100 pF	±20%
102M	1000 pF	±20%
252P	2500 pF	+100/-0%
402Z	4000 pF	+80/20%
103Z**	.01 µF	+80/-20%

10 -10 Amps (Pi)
20 - 20 Amps (Feedthrough)

T - Tape and reel packaging
B - Bulk packaging

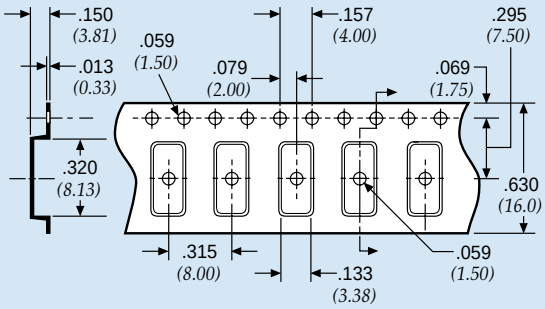
0 - 500 pieces
2 - 2,000 pieces

Note: Tape and reel packaging - 500 pieces (7") and 2,000 pieces (13")

Technical Notes

- Soldering recommendations supplied upon request
- Reflow temperature limit is 250°C
- Unit weight is approximately 0.4 grams
- Tape and reel packaging available for automated assembly

PSM Tape and Reel Packaging



Dimensions in inches *(mm)*

PSM Recommended Board Pattern

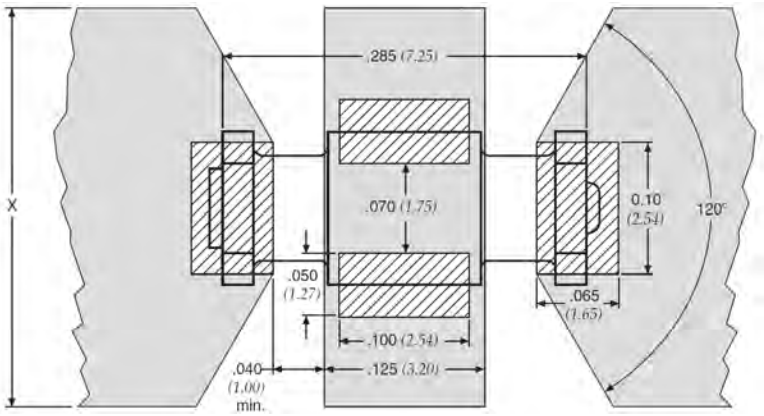
Solder paste pattern

Recommended pad, must be able to support continuous signal current

X = 0.350" minimum for 1 oz. copper (0.036 mm thickness)

X = 0.200" minimum for 2 oz. copper (0.071 mm thickness)

For low current (10 Amp or less)
X = 0.130" minimum for 1 oz. copper (0.036 mm thickness for 10 Amp and 0.5 oz. copper - 0.018 mm



Dimensions in inches (mm)

SPECTRUM CONTROL

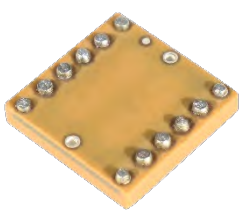
DATA SHEET

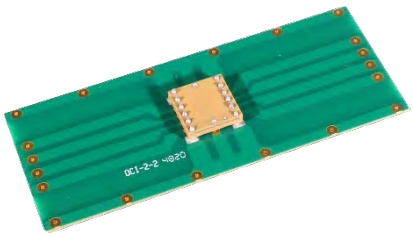
Multiline Surface Mount Array

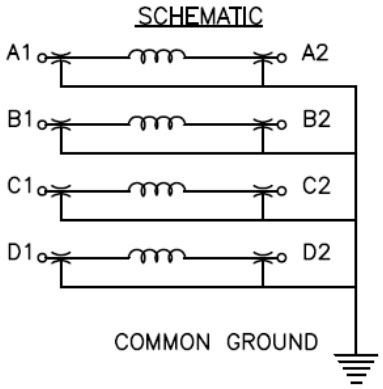
Integrated surface mount package with exceptional EMI protection of signal and power lines.

Features

- Provide EMI filtered signal lines between system modules
- Reduce or eliminate the need to assemble filters at bulkhead
- Economical method to meet EMC requirements
- Improve reliability, every filter is 100% tested for key parameters
- Superior performance to chip level solutions
- Easy connection and installation
- Peak temperature +260°C for IR and FC reflow systems



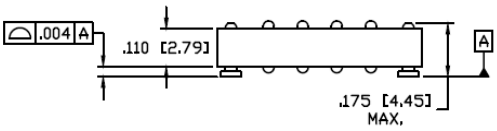




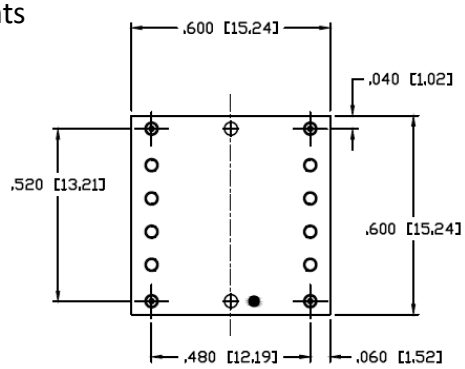
Applications

- Telecommunication equipment
- Military and defense applications
- Industrial control panels
- Measuring and testing instruments
- Medical equipment

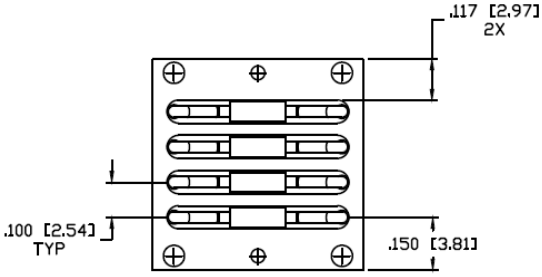
**Dimensions in inches*



Side View



Top View



Bottom View

Filter Circuits	Suggested Capacitance		3dB Max. Cut-Off Frequency (MHz)	Working Voltage DC -55°C to +125°C	Minimum Insertion Loss - Decibels (dB) 50 ohm System per MIL-STD-220 (no load)									
	Value	Tolerance			500 KHz	1 MHz	5 MHz	10 MHz	30 MHz	50 MHz	100 MHz	300 MHz	500 MHz	1 GHz
Pi	100pF	± 20%	32	200V	-	-	-	-	-	-	3	12	18	25
	470pF	± 20%	10.8	200V	-	-	-	-	4	8	15	30	30	25
	1000pF	± 20%	5.4	200V	-	-	-	2	10	17	28	30	30	25
	2500pF	+100/-0%	1.3	200V	-	-	4	9	22	32	40	30	30	25
	4000pF	+100/-0%	0.8	200V	-	-	7	12	30	40	46	30	30	25
	8000pF	+100/-0%	0.4	200V	-	-	11	19	42	50	47	30	30	25
	25nF	+100/-0%	0.26	200V	4	9	22	40	60	60	60	30	30	25
	50nF	+100/-0%	0.13	200V	9	14	35	53	60	60	60	30	30	25
	0.1µF	+100/-0%	0.03	200V	14	18	45	60	60	60	60	30	30	25

Notes

- Current Rating: 10 amps per line
- Terminations: silver plated
- Other capacitance values available

SPECTRUM CONTROL

DATA SHEET

Three Terminal Chips

Surface Mount EMI Filters

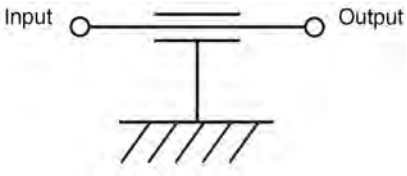
Features

- Excellent performance in high current applications
- Non-polar, surface mountable
- Superior filtering characteristics
- Superb ability to withstand transient voltages and surge
- Offers exceptional solderability and resistance to solder heat
- Available in 0603, 0805, 1205, and 1806 body size
- Two amp current rating available
- Available lead free/RoHS Compliant

Applications

- Cellular telephones and base stations
- Telecommunication equipment
- Industrial electronic interface or programmable controllers
- Electronic automotive equipment
- Computer and peripheral equipment

Circuit Schematic



Typical Electrical Characteristics

Capacitance Range	COG (NPO) 22 pF to 470 pF X7R 470 pF to 47,000 pF YV5 220,000 pF X5R 100,000 pF
Capacitance Tolerance	COG (NPO) +50/-20% X7R +50/-20% YV5 +80/-20% X5R +/-20%
Temperature Coefficient	COG (NPO) 0 ±/30 ppm/°C, -55 to +125°C +/-15% X7R -55 to +125°C YV5 -25 to +85˚C X5R -55 to +85˚C
Insulation Resistance	up to 100,000 pF 10000 Megohms 47,000 pF 5000 Megohms
DC Resistance	0.4 Amp or less 0.3 ohm max. 1 Amp 0.08 ohm max. 2 Amp 0.04 ohm max.
Rated Voltage	up to 100 VDC
Rated Current	up to 2 Amps

SPECTRUM CONTROL

DATA SHEET

Three Terminal Chips

Surface Mount EMI Filters

Selection Guide

Part Number	Body Size	Capacitance (In Picofarad)	Capacitance Tolerance	Temp. Charact.	Rated Voltage (Volts DC)	Rated Current (Amps DC)	IR (Megohms Min.)	DC Resistance (ohm Max.)	Operating Temp.
SF0603C220SBNB-*	0603	22	+50/-20%	COG	50	0.3	10,000	0.3	-55/+125°C
SF0603C470SBNB-*	0603	47	+50/-20%	COG	50	0.3	10,000	0.3	-55/+125°C
SF0603C101SBNB-*	0603	100	+50/-20%	COG	50	0.3	10,000	0.3	-55/+125°C
SF0603C221SNNB-*	0603	220	+50/-20%	COG	50	0.3	10,000	0.3	-55/+125°C
SF0603X471SBNB-*	0603	470	+50/-20%	X7R	50	0.3	10,000	0.3	-55/+125°C
SF0603X102SBNB-*	0603	1,000	+50/-20%	X7R	50	0.3	10,000	0.3	-55/+125°C
SF0603X222SBNB-*	0603	2,200	+50/-20%	X7R	50	0.3	10,000	0.3	-55/+125°C
SF0603X223SANC-*	0603	22,000	+50/-20%	X7R	25	0.5	10,000	0.15	-55/+125°C
SF0603R104MAND-*	**0603**	**100,000**	**+/-20%**	**X7R**	**25**	**1.0**	**10,000**	**0.08**	**-55/+85°C**
SF0805C220SBNC-*	0805	22	+50/-20%	COG	50	0.4	10,000	0.3	-55/+125°C
SF0805C470SBNC-*	0805	47	+50/-20%	COG	50	0.4	10,000	0.3	-55/+125°C
SF0805C101SBNC-*	0805	100	+50/-20%	COG	50	0.4	10,000	0.3	-55/+125°C
SF0808C221SBNS-*	0805	22	+50/-20%	COG	50	0.4	10,000	0.3	-55/+125°C
SF0805X471SBNC-*	0805	470	+50/-20%	X7R	50	0.4	10,000	0.3	-55/+125°C
SF0805X102SBNC-*	0805	1,000	+50/-20%	X7R	50	0.4	10,000	0.3	-55/+125°C
SF0805X222SBNC-*	0805	2,200	+50/-20%	X7R	50	0.4	10,000	0.3	-55/+125°C
SF0805X223SBND-*	**0805**	**22,000**	**+50/-20%**	**X7R**	**50**	**1.0**	**10,000**	**0.08**	**-55/+125°C**
SF1205C220SBNB-*	1205	22	+50/-20%	COG	50	0.3	10,000	0.3	-55/+125°C
SF1205C470SBNB-*	1205	47	+50/-20%	COG	50	0.3	10,000	0.3	-55/+125°C
SF1205C101SBNB-*	1205	100	+50/-20%	COG	50	0.3	10,000	0.3	-55/+125°C
SF1205C221SBNB-*	1205	220	+50/-20%	COG	50	0.3	10,000	0.3	-55/+125°C
SF1205X471SBNB-*	1205	470	+50/-20%	X7R	50	0.3	10,000	0.3	-55/+125°C
SF1205X102SBNB-*	1205	1,000	+50/-20%	X7R	50	0.3	10,000	0.3	-55/+125°C
SF1205X222SBNB-*	1205	2,200	+50/-20%	X7R	50	0.3	10,000	0.3	-55/+125°C
SF1205X223SBNB-*	1205	22,000	+50/-20%	X7R	50	0.3	10,000	0.3	-55/+125°C
SF1205X473SBND-*	**1205**	**47,000**	**+50/-20%**	**X7R**	**50**	1.0	5,000	0.08	-55/+125°C
SF1806C220SDNB-*	1806	22	+50/-20%	COG	100	0.3	10,000	0.3	-55/+125°C
SF1806C470SDNB-*	1806	47	+50/-20%	COG	100	0.3	10,000	0.3	-55/+125°C
SF1806C101SDNB-*	1806	100	+50/-20%	COG	100	0.3	10,000	0.3	-55/+125°C
SF1806C221SDNB-*	1806	220	+50/-20%	COG	100	0.3	10,000	0.3	-55/+125°C
SF1806C471SDNB-*	1806	470	+50/-20%	COG	100	0.3	10,000	0.3	-55/+125°C
SF1806X102SDNB-*	1806	1,000	+50/-20%	X7R	100	0.3	10,000	0.3	-55/+125°C
SFI1806X222SDNB-*	1806	2,200	+50/-20%	X7R	100	0.3	10,000	0.3	-55/+125°C
SF1806X103SDNB-*	1806	10,000	+50/-20%	X7R	100	0.3	10,000	0.3	-55/+125°C
SF1806X223SDNB-*	1806	22,000	+50/-20%	X7R	100	0.3	10,000	0.3	-55/+125°C
2 AMP FILTER SF1806Y224ZBNE-*	**1806**	**220,000**	**+80/-20%**	**Y5V†**	**50**	**2.0**	**1,000**	**0.048**	**-25/+85°C**

Bold Part Number *= High Current Applications*

† *= Temperature Characteristic is +30/-80%*

***-** = Denotes Packaging Style. Replace with T for Tape and Reel*

SPECTRUM CONTROL

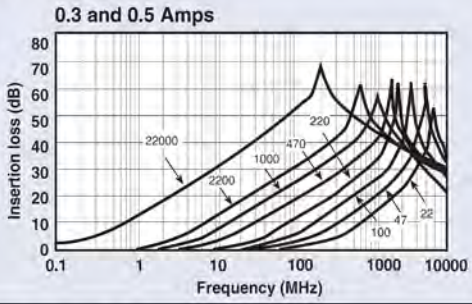
DATA SHEET

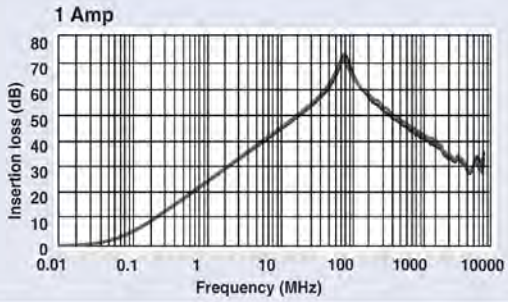
Three Terminal Chips

Surface Mount EMI Filters

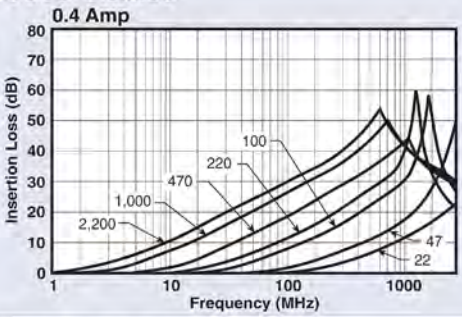
Insertion Loss (Per MIL-STD-220)

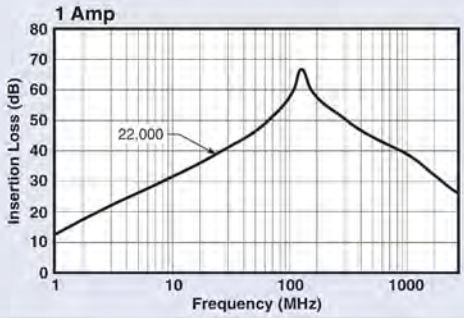
SF0603 Series



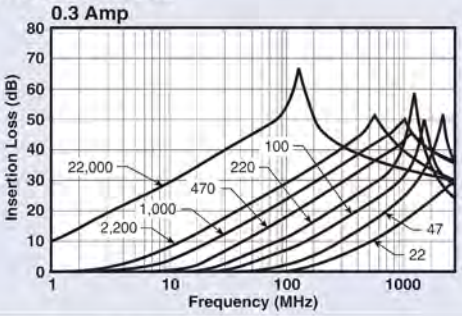


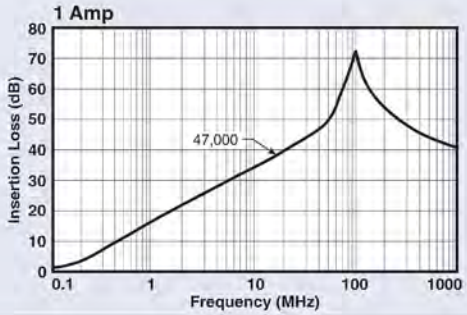
SF0805 Series



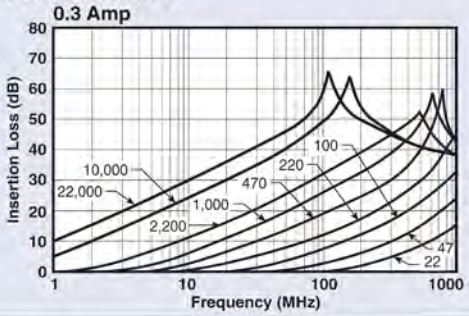


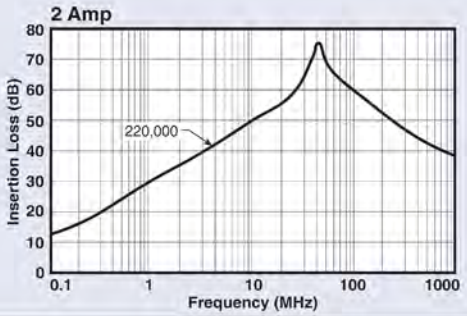
SF1205 Series





SF1806 Series



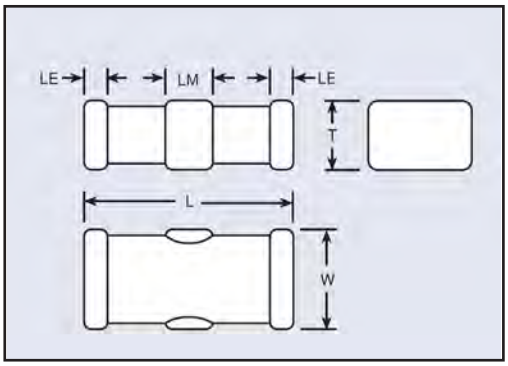


SPECTRUM CONTROL

DATA SHEET

Three Terminal Chips

Surface Mount EMI Filters



Mechanical Dimensions

Dimensions in inches (mm)

Body Style/Size	Body Length (L)	Body Width (W)	Body Thickness (T)	End Terminal Length (LE)	Middle Terminal Length (LM)
SF0603	0.063 +/- 0.006 *(1.60 +/- 0.15)*	0.031 +/- 0.006 *(0.80 +/- 0.15)*	0.023 +/- 0.006 *(0.6 +/- 0.15)*	0.008 +/- 0.006 *(0.2 +/- 0.15)*	0.020 +/- 0.006 *(0.5 +/- 0.15)*
SF0805	0.079 +/- 0.008 *(2.0 +/- 0.2)*	0.049 +/- 0.008 *(1.25 +/- 0.2)*	0.032 +/- 0.008 *(0.8 +/- 0.2)*	0.012 +/- 0.008 *(0.3 +/- 0.2)*	0.024 +/- 0.008 *(0.6 +/- 0.2)*
SF1205	0.126 +/- 0.008 *(3.2 +/- 0.2)*	0.049 +/- 0.008 *(1.25 +/- 0.2)*	0.028 +/- 0.008 *(0.7 +/- 0.2)*	0.016 +/- 0.012 *(0.4 +/- 0.3)*	0.043 +/- 0.012 *(1.1 +/- 0.3)*
SF1806	0.177 +/- 0.012 *(4.5 +/- 0.3)*	0.063 +/- 0.012 *(1.6 +/- 0.3)*	0.039 +/- 0.012 *(1.0 +/- 0.3)*	0.020 +/- 0.012 *(0.5 +/- 0.3)*	0.055 +/- 0.012 *(1.4 +/- 0.3)*

Ordering Information

Example: **SF0805C221SBNCT**

This part number represents a three terminal chip with a body size of 0805 with a COG (NPO) dielectric. The capacitance is 220 pF with a capacitance tolerance of +50%/-20%. Voltage rating is 50 Volts DC. It has nickel barrier, solder plated terminations and a current rating of 0.4 Amp, (400 milliamps). The parts are taped and reeled.

SF	0805	C	221	S	B	N	C	T
Style SF	**Size** 0603 0805 1205 1806	**Ceramic** **C** - COG **X** - X7R **Y** - Y5V **R** - X5R	**Capacitance Code** First two numbers are significant the third number refers to number of zeros	**Capacitance Tolerance** **S** - +50%/-20% **Z** - +80%/-20% **M** - +/- 20%	**Rated Voltage** **A** - 25 **B** - 50 **D** - 100	**Termination** **N** - Ni Barrier, Solder Plated	**Current Rating** **B** - 0.3 A **C** - 0.4 A **D** - 1A **E** - 2A **F** - 3A **G** - 4A **H** - 5A **I** - 6A	**Packaging** **T** - Tape & Reel

SPECTRUM CONTROL

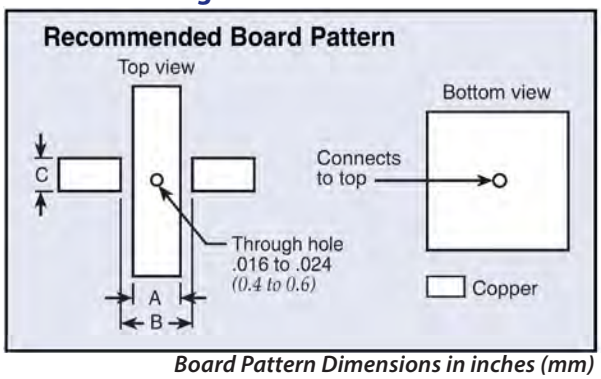
DATA SHEET

Three Terminal Chips

Surface Mount EMI Filters

Soldering Instructions

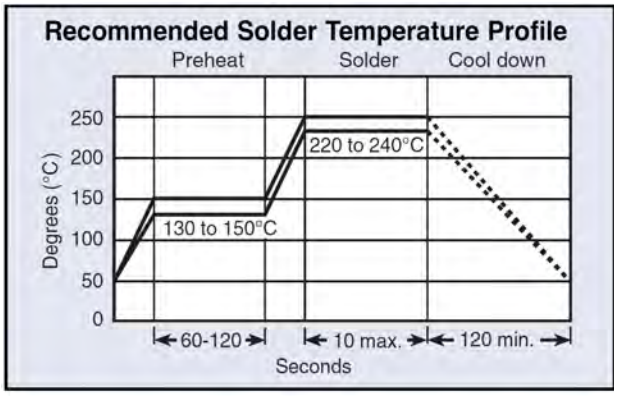
Reflow Soldering



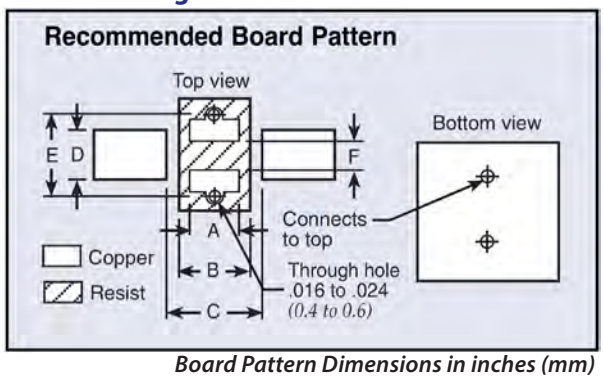
Board Pattern Dimensions in inches (mm)

Body Style/Size	Dimension		
	A	B	C
SF0603	0.020 *(0.5)*	0.047 *(1.2)*	0.031 *(0.8)*
SF0805	0.024 *(0.6)*	0.059 *(1.59)*	0.039 *(1.0)*
SF1205	0.051 *(1.3)*	0.091 *(2.3)*	0.047 *(1.2)*
SF1806	0.079 *(2.0)*	0.138 *(3.5)*	0.051 *(1.3)*

Reflow Soldering



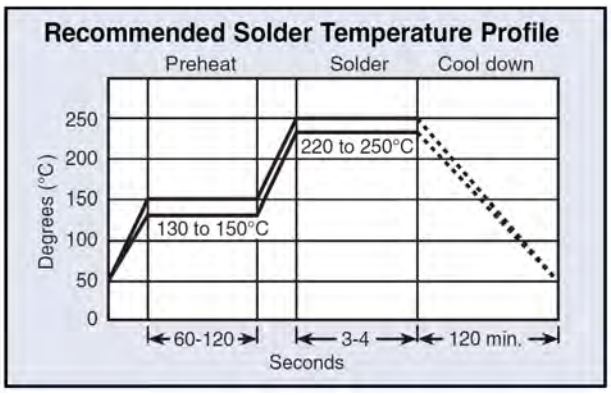
Flow Soldering



Board Pattern Dimensions in inches (mm)

Body Style/Size	Dimension					
	A	B	C	D	E	F
SF0603	0.020 *(0.5)*	0.031 *(0.8)*	0.047 *(1.2)*	0.031 *(0.8)*	0.071 *(1.8)*	0.016 *(0.4)*
SF0805	0.024 *(0.6)*	0.031 *(0.8)*	0.059 *(1.5)*	0.039 *(1.0)*	0.087 *(2.2)*	0.024 *(0.6)*
SF1205	0.051 *(1.3)*	0.059 *(1.5)*	0.091 *(2.3)*	0.047 *(1.2)*	0.118 *(3.0)*	0.024 *(0.6)*
SF1806	0.059 *(1.5)*	0.079 *(1.5)*	0.138 *(3.5)*	0.051 *(1.3)*	0.118 *(3.0)*	0.024 *(0.6)*

Flow Soldering



General Soldering Notes

- High soldering temperatures and long soldering times can cause leaching of the termination and adversely affect adhesion. These conditions can also decrease capacitance value. Use the above recommended solder temperature cycle.
- Due to the mechanical characteristic of ceramic composition, aggressive thermal shock will degrade performance. Preheat the assembly before soldering using the above solder temperature profile as a guide.
- Use mild flux (less than 0.2% by weight of Chlorine), preferable rosin based. If water soluble, wash thoroughly to assure all residue is removed from the underside of components.
- Ultrasonic Cleaning
  When using an ultrasonic cleaning method, the following range is recommended:

  Frequency: Not to exceed 28kHz
  Output Power: Not to exceed 20W/liter
  Cleaning Time: 5 minutes max

SPECTRUM CONTROL

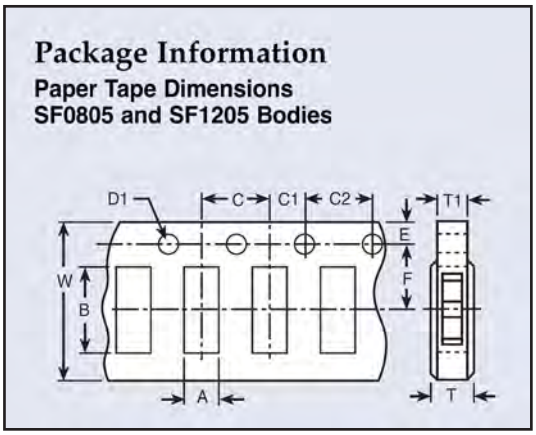
DATA SHEET

Three Terminal Chips

Surface Mount EMI Filters

Package Quantities

Body Style/Size	Tape and Reel
SF0603	4,000 units/reel
SF0805	4,000 units/reel
SF1205	4,000 units/reel
SF1806	2,000 units/reel

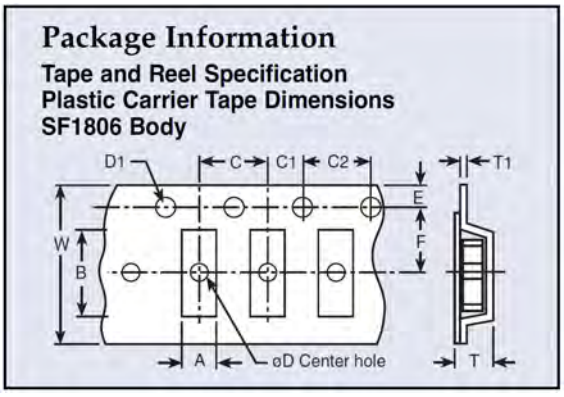


Dimensions in inches (mm)

Body Style/ Size	Chip Cavity		Tape			Holes			Hole Diameter	Thickness	
	Length A	Width B	Width w	Center to End F	Indexing to End E	Center to Center C	Indexing to Center C	Indexing to Indexing C	Indexing D1	Overall T (Max.)	Carrier Tape T1 (Max.)
SF0603	0.039 +/-0.00? *(1.0 +/-0.?)*	0.075 +/-0.00? *(1.9 +/-0.?)*	0.0315 +/-0.012 *(8.0 +/-0.3)*	0.138 +/-0.002 *(3.5 +/-0.05)*	0.069 +/-0.004 *(1.75 +/-0.1)*	0.157 +/-0.004 *(4.0 +/-0.1)*	0.079 +/-0.004 *(2.0 +/-0.1)*	0.157 +/-0.008 *(4.0 +/-0.1)*	0.059 +0.004/0 *(1.5 +0.1/-0)*	0.048 *(1.1)*	0.039 *(1.0)*
SF0805	0.064 +/-0.008 *(1.62 +/-0.2)*	0.091 +/-0.008 *(2.3 +/-0.2)*	0.0315 +/-0.012 *(8.0 +/-0.3)*	0.138 +/-0.002 *(3.5 +/-0.05)*	0.069 +/-0.004 *(1.75 +/-0.1)*	0.157 +/-0.004 *(4.0 +/-0.1)*	0.079 +/-0.004 *(2.0 +/-0.1)*	0.157 +/-0.008 *(4.0 +/-0.1)*	0.059 +0.004/0 *(1.5 +0.1/-0)*	0.048 *(1.1)*	0.039 *(1.0)*
SF1205	0.067 +/-0.008 *(1.70 +/-0.2)*	0.138 +/-0.008 *(3.5 +/-0.2)*	0.0315 +/-0.012 *(8.0 +/-0.3)*	0.138 +/-0.002 *(3.5 +/-0.05)*	0.069 +/-0.004 *(1.75 +/-0.1)*	0.157 +/-0.004 *(4.0 +/-0.1)*	0.079 +/-0.004 *(2.0 +/-0.1)*	0.157 +/-0.008 *(4.0 +/-0.1)*	0.059 +0.004/0 *(1.5 +0.1/-0)*	0.048 *(1.1)*	0.039 *(1.0)*

Plastic Reel Dimensions

Body Style/Size	Diameter (Max.)	Width (Max.)
SF0603	7.00 *(180)*	0.46 *(11.5)*
SF0805	7.00 *(180)*	0.46 *(11.5)*
SF1205	7.00 *(180)*	0.46 *(11.5)*
SF1806	7.00 *(180)*	0.46 *(11.5)*



Dimensions in inches (mm)

Body Style/ Size	Chip Cavity		Tape			Holes			Hole Diameter		Thickness	
	Length A	Width B	Width w	Center to End F	Indexing to End E	Center to Center C	Indexing to Center C	Indexing to Indexing C	Center D (Min.)	Indexing D1	Overall T (Max.)	Carrier Tape T1 (Max.)
SF1806	0.071 +/-0.008 *(1.80+/-.02)*	0.185 +/-0.008 *(4.70 +/-0.2)*	0.472 +/-0.008 *(12.0+/-0.2)*	0.217 +/-0.002 *(5.5 +/-0.05)*	0.069 +/-0.004 *(1.75 +/-0.1)*	0.157 +/-0.004 *(4.0 +/-0.1)*	0.079 +/-0.004 *(2.0 +/-0.1)*	0.157 +/-0.008 *(4.0 +/-0.1)*	0.059 *(1.5)*	0.059 +0.004/0 *(1.5 +0.1/-0)*	0.048 *(1.1)*	0.039 *(1.0)*

SPECTRUM CONTROL

DATA SHEET

SA Series

Surface Mount Filter Arrays

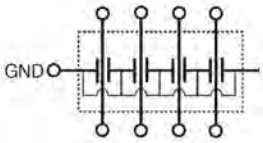
Features

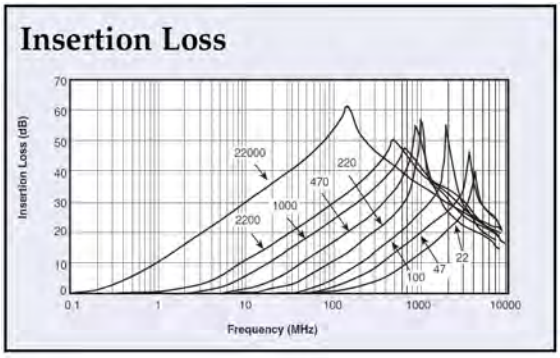
- The filters structure minimizes residual inductance with a high self resonant frequency, ensuring large insertion loss in a wide band.
- The common ground electrode built into the chip ensures complete grounding of all lines at the ground on both ends. The filter is designed to control cross talk.
- An optimum constant can be selected from the capacity range of 22-22,000 pF to best suit the frequency.
- Solder plated nickel barrier terminations offer good solderability and resistance to soldering heat.
- Available lead free/RoHS compliant

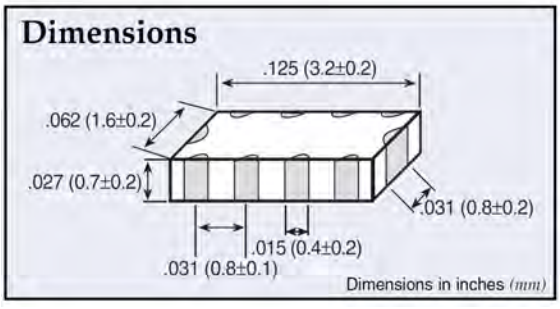
Applications

- Computer peripheral equipment
- Telecommunications equipment
- Power amplifiers
- Power supplies
- Temperature and motor controls

Circuit Schematic







Typical Electrical Characteristics

Rated Voltage	25 VDC to 50 VDC
Rated Current	0.3 Amps
IR	10,000 MΩ Min.
DC Resistance	0.3Ω Max.
Temperature Range	-55°C to +125°C
Capacitance Range	22 pF to 22,000 pF
Capacitance Tolerance	±20%

Specifications

Part Number	Rated Voltage (@ 50/60Hz)	Rated Current	Temperature Characteristic	IR	DC Resistance	Operating Temp.	Capacitance (pF)
SA1206C220	50 VDC	0.3A DC	C	10,000MΩ min.	0.3Ω max.	-55/+125°C	22
SA1206C470			C				47
SA1206C101			C				100
SA1206C221			C				220
SA1206R471			U				470
SA1206R102			R				1,000
SA1206R222			R				2,200
SA1206R223	25 VDC		R				22,000

SPECTRUM CONTROL

DATA SHEET

SA Series

Surface Mount Filter Arrays

Ordering Information

SA	1206	C	220	M	B	N	T

Style
SA Series

Size
1206

Temperature Characteristics
C +/- 30 ppm/°C
R +/- 15%
U -750 +/- 120 ppm/°C

Capacitance
22pF
47pF
100pF
220pF
470pF
1,000pF
2,000pF
22,000pF

Capacitance Tolerance
M = +/- 20%

Rated Voltage (VDC)
A = 25
B = 30

Termination
N = Ni Barrier Solder Plated

Packaging
T - Tape and reel 4,000 pc/reel