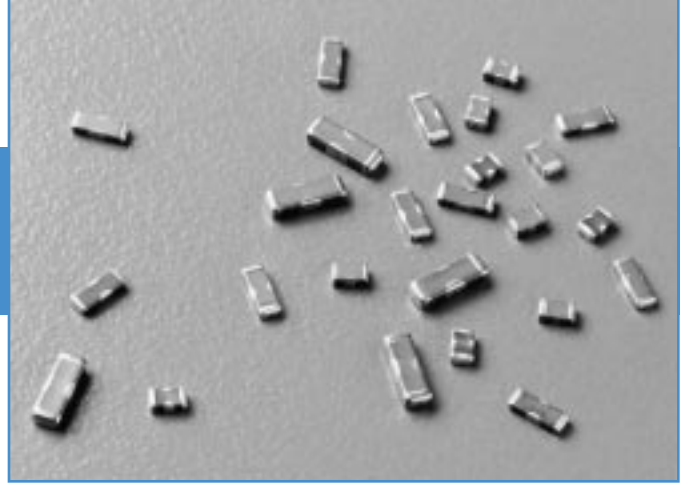


Surface Mount EMI Filters Three Terminal Chips



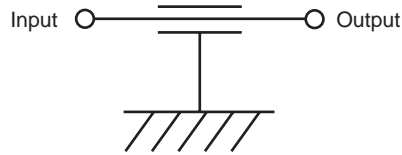
Features

- 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 0805, 1205 and 1806 body size
- Two amp current rating available

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

| | | |
|--------------------------|-----------------|--------------------------------|
| <i>Capacitance</i> | | |
| <i>Range</i> | COG (NPO) | 22 pF to 470 pF |
| | X7R | 470 pF to 47,000 pF |
| <i>Capacitance</i> | | |
| <i>Tolerance</i> | COG (NPO) | ± 50%/-20% |
| | X7R | ± 50%/-20% |
| <i>Temperature</i> | | |
| <i>Coefficient</i> | COG (NPO) | 0 ±30 ppm/°C, -55 to +125°C |
| | X7R | +/-15%, -55 to +125°C |
| <i>Insulation</i> | | |
| <i>Resistance</i> | up to 22,000 pF | 10000 Megohms |
| | 47,000 pF | 5000 Megohms |
| <i>DC</i> | | |
| <i>Resistance</i> | 0.4 Amp or less | 0.3 ohm max. |
| | 1 Amp | 0.08 ohm max. |
| | 2 Amp | 0.04 ohm max. |

Surface Mount EMI Filters Three Terminal Chips

Selection Guide

Surface Mount Filters

| 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. |
|--|-------------|----------------------------|-----------------------|----------------|--------------------------|-------------------------|-------------------|--------------------------|-------------------|
| 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 |
| SF0805C221SBNC-* | 0805 | 220 | +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 |
| SF1806X222SDNB-* | 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 | 0.04 | -25/+85°C |

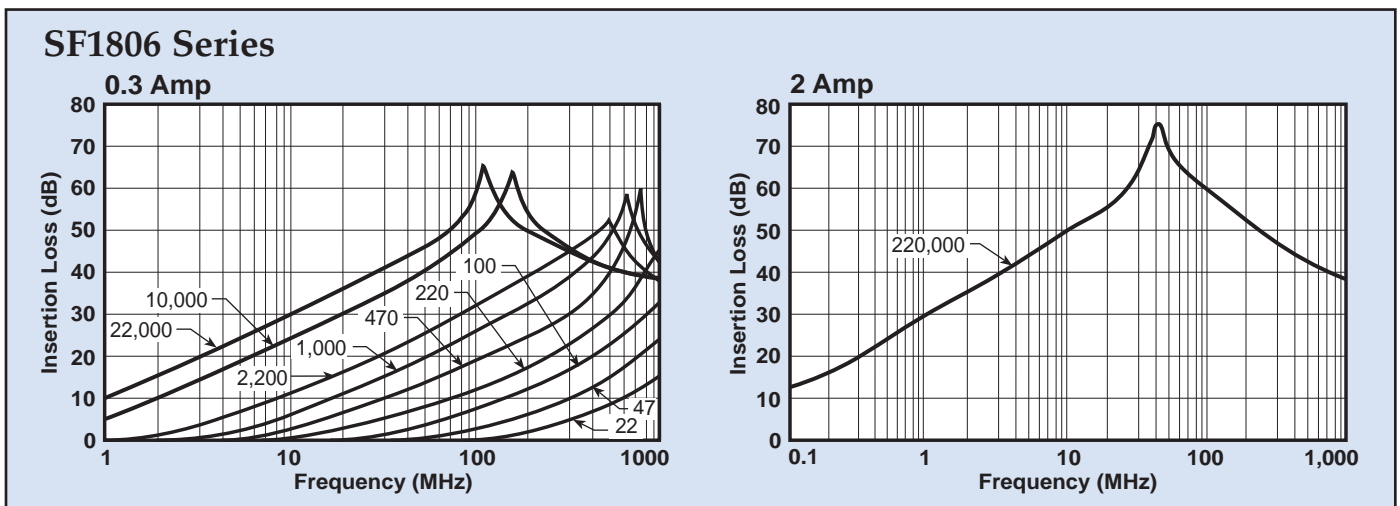
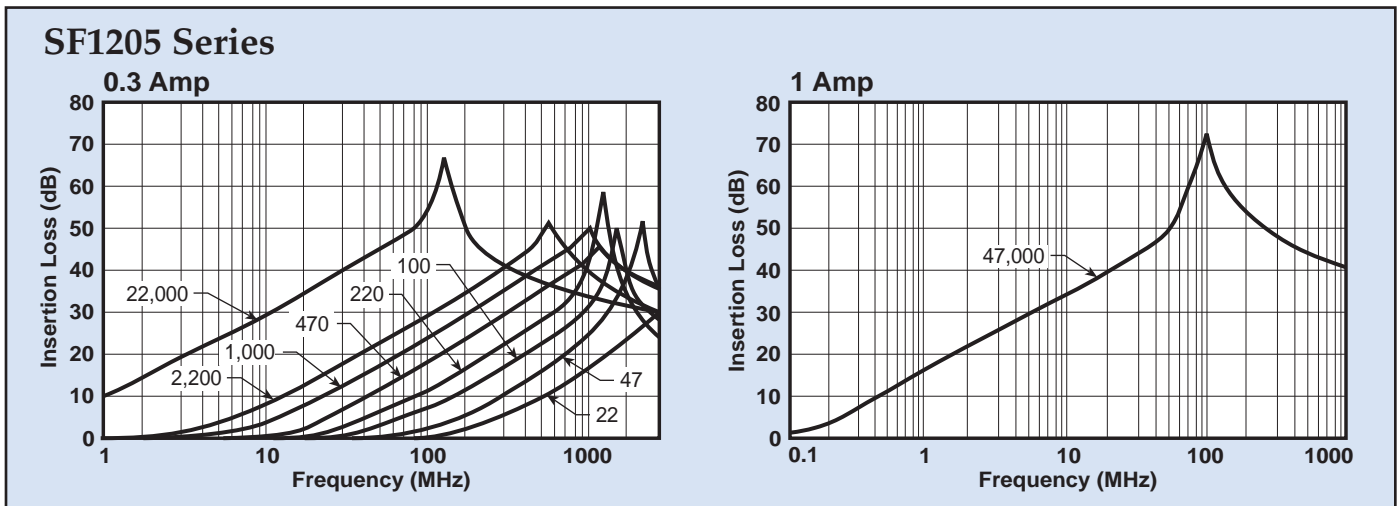
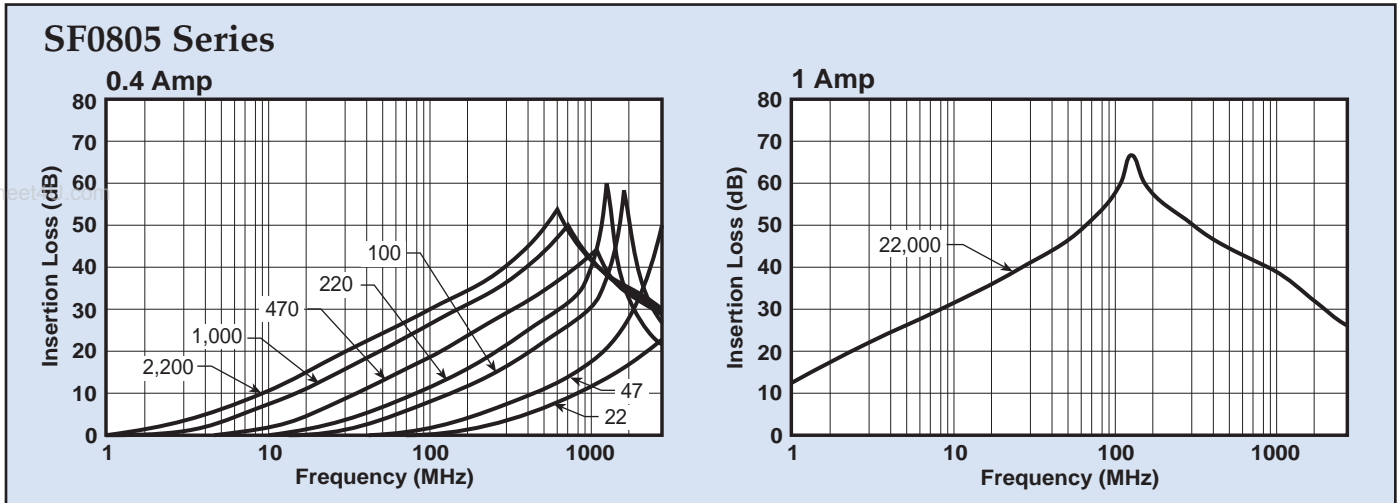
Bold Letter = High Current Applications

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

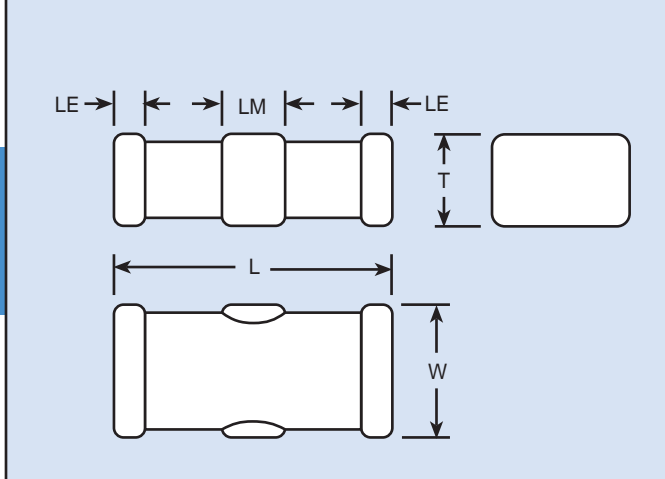
† = Temperature Characteristic is +30/-80%

Surface Mount EMI Filters Three Terminal Chips

Insertion Loss (Per Mil Stand 220)



Surface Mount EMI Filters Three Terminal Chips



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) |
|-----------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 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 | Size | Ceramic | Capacitance Code | Capacitance Tolerance | Rated Voltage (Vdc) | Termination | Current Rating | Packaging |
| SF | 0805 1205 1806 | C - COG X - X7R Y - Y5V | First Two Numbers are Significant, the Third Number Refers to Number of Zeroes | S - +50%/-20% Z - +80%/-20% | B - 50 D - 100 | N - Ni Barrier, Solder Plated | B - 0.3 A C - 0.4 A D - 1 A E - 2 A | T - Tape and Reel B - Bulk |

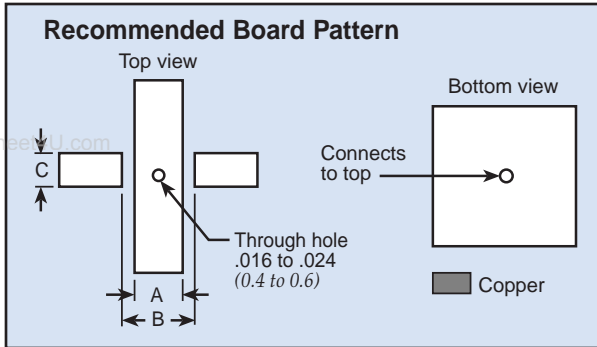
Surface Mount EMI Filters

Three Terminal Chips

Soldering Specifications

Soldering Instructions

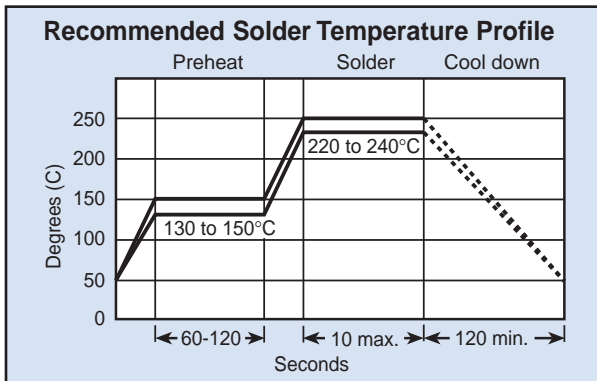
Reflow Soldering



Board Pattern Dimensions in inches (mm)

| Body Style/Size | Dimension | | |
|-----------------|----------------|----------------|----------------|
| | A | B | C |
| SF0805 | 0.024 (0.6) | 0.051 (1.3) | 0.079 (2.0) |
| SF1205 | 0.059 (1.5) | 0.091 (2.3) | 0.138 (3.5) |
| SF1806 | 0.039 (1.0) | 0.047 (1.2) | 0.051 (1.3) |

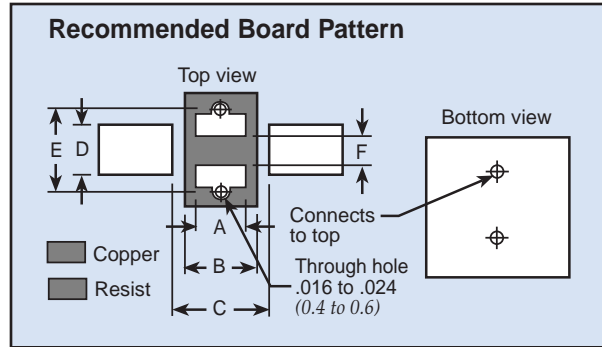
Reflow Soldering



General Soldering Notes

1. 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.
2. 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.

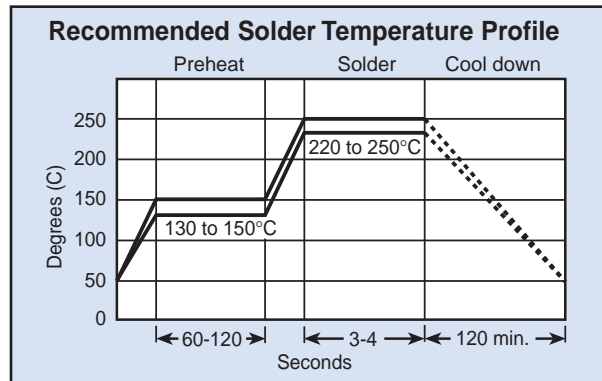
Flow Soldering



Board Pattern Dimensions in inches (mm)

| Body Style/Size | Dimension | | | | | |
|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | A | B | C | D | E | F |
| 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) | 0.047 (1.2) | 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



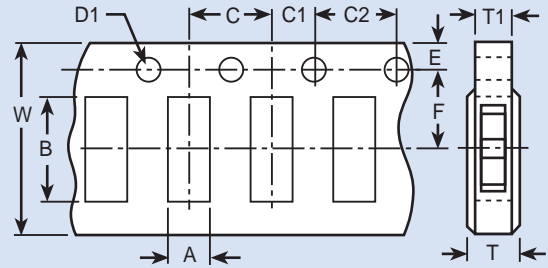
3. Use mild flux (less than 0.2% by weight of Chlorine), preferable rosin based. If water soluble, wash thoroughly to assure all residue is removed from the underside of components.
4. Ultrasonic Cleaning
When using an ultrasonic cleaning method, the following range is recommended:

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

Three Terminal Chips Packaging Specifications

Package Information

Paper Tape Dimensions SF0805 and SF1205 Bodies



Dimensions in inches (mm)

Package Quantities

| Body Style/Size | Tape and Reel | Bulk |
|-----------------|------------------|-----------------|
| SF0805 | 4,000 units/reel | 1,000 units/bag |
| SF1205 | 4,000 units/reel | 1,000 units/bag |
| SF1806 | 2,000 units/reel | 1,000 units/bag |

| 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 C1 | Indexing to Center C2 | Indexing D1 | Overall T (Max.) | Carrier Tape T1 (Max.) |
| SF0805 | 0.064 +/-0.008 (1.62 +/-0.2) | 0.091 +/-0.008 (2.3 +/-0.2) | 0.315 +/-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) | 0.043 (1.1) | 0.039 (1.0) |
| SF1205 | 0.067 +/-0.008 (1.70 +/-0.2) | 0.138 +/-0.008 (3.5 +/-0.2) | 0.315 +/-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) | 0.043 (1.1) | 0.039 (1.0) |

Surface Mount Filters

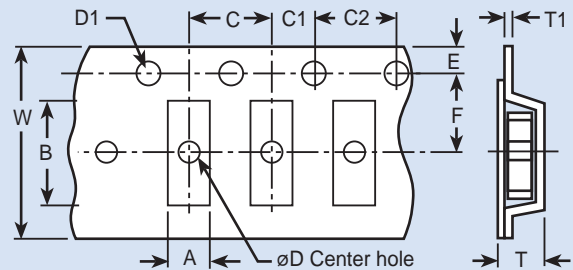
Plastic Reel Dimensions

Dimensions in inches (mm)

| Body Style/Size | Diameter (Max.) | Width (Max.) |
|-----------------|-----------------|--------------|
| SF0805 | 7.00 (180) | 0.46 (11.5) |
| SF1205 | 7.00 (180) | 0.46 (11.5) |
| SF1806 | 7.00 (180) | 0.61 (11.5) |

Package Information

Tape and Reel Specification Plastic Carrier Tape Dimensions SF1806 Body



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 C1 | Indexing to Center C2 | Center D (Min.) | Indexing D1 | Overall T (Max.) | Tape T1 (Max.) |
| SF1806 | 0.071 +/-0.008 (1.80 +/-0.2) | 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) | 0.098 (2.5) | 0.024 (0.6) |

Surface Mount EMI Filters LC Type Chips

Features

- High efficiency EMI surface mount filter
- Non-polar, surface mountable
- Ideally suited for high frequency signal lines
- Steep insertion loss (IL) characteristics
- Effective over a wide range of frequencies
- Monolithic construction of dielectric and ferrite materials
- Available in the 0805 and 1206 body sizes

Typical Electrical Characteristics

Cut-off
Frequency Ranges 10 MHz to 220 MHz

Cut-off
Frequency Tolerances $\pm 20\%$

Rated Voltage 25 Volt

Rated Current 100 milliamp

IR 10 Megohms min.

Temperature Range -25°C to $+85^{\circ}\text{C}$

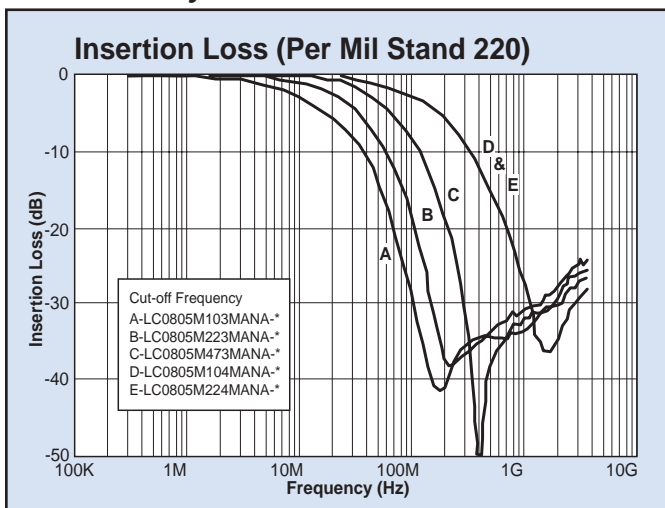
DC Resistance 6 ohms max.

Applications

- Cellular telephones and base stations
- Telecommunication equipment
- Industrial electronic interface or programmable controllers
- Computer and peripheral equipment
- Digital AV equipment such as TV, VCR and DVD
- Digital circuit equipment

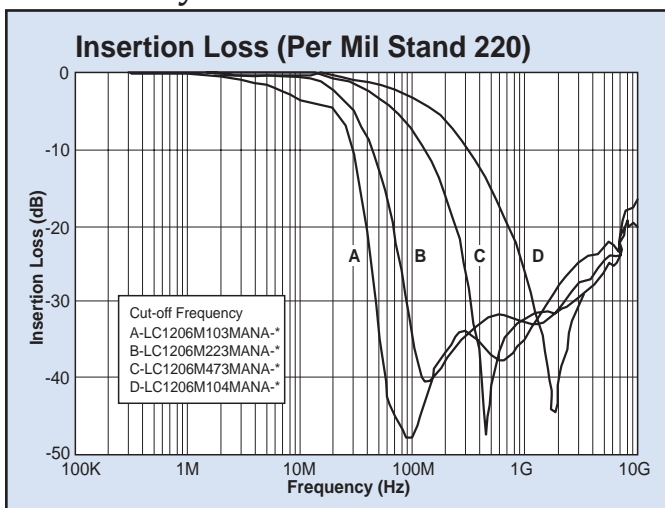


LC0805 Style



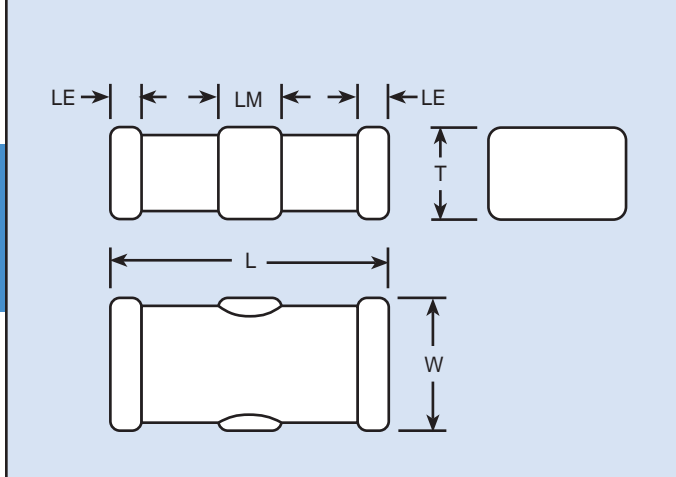
-* Denotes packaging style, replace with T for tape and reel or B for bulk

LC1206 Style

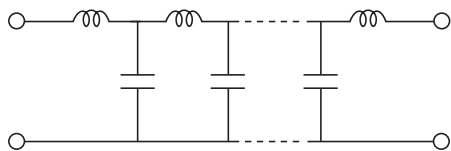


-* Denotes packaging style, replace with T for tape and reel or B for bulk

Surface Mount EMI Filters LC Type Chips



Circuit Schematic



Surface Mount 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) |
|-----------------|------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|
| LC0805 | 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) |
| LC1206 | 0.126 ± 0.008 (3.2 ± 0.2) | 0.058 ± 0.008 (1.60 ± 0.2) | 0.0394 ± 0.008 (1.0 ± 0.2) | 0.016 ± 0.012 (0.4 ± 0.3) | 0.043 ± 0.012 (1.1 ± 0.3) |

Selector Guide

| Part Number | Body Size | Cut-off Frequency | Cut-off Frequency Tolerance | Rated Voltage | Rated Current | I.R. | Temperature Range |
|------------------|-----------|-------------------|-----------------------------|---------------|---------------|-------|-------------------|
| LC0805M103MANA-* | 0805 | 10 MHz | ± 20% | 25 V | 100 mA | 10 MΩ | -25°C ~ +85°C |
| LC0805M223MANA-* | | 22 MHz | | | | | |
| LC0805M473MANA-* | | 47 MHz | | | | | |
| LC0805M104MANA-* | | 100 MHz | | | | | |
| LC0805M224MANA-* | | 220 MHz | | | | | |
| LC1206M103MANA-* | 1206 | 10 MHz | ± 20% | 25 V | 100 mA | 10 MΩ | -25°C ~ +85°C |
| LC1206M223MANA-* | | 22 MHz | | | | | |
| LC1206M473MANA-* | | 47 MHz | | | | | |
| LC1206M104MANA-* | | 100 MHz | | | | | |

* Denotes packaging style, replace with T for tape and reel or B for bulk

Ordering Information

Example: LC1206M223MANAT

This part number represents an LC EMI filter chip with a body size of 1206. The cut-off frequency is 22 MHz with a tolerance of ± 20%, voltage rating is 25 Volts DC. It has nickel barrier, solder plated termination and a current rating of 0.1 Amp (100 milliamps). The parts are taped and reeled.

| LC | 1206 | M223 | M | A | N | A | T |
|-------|--------------|---|-------------------|---------------|----------------------------------|-----------------------|----------------------------------|
| Style | Size | Cut-off Frequency | Cut-off Tolerance | Rated Voltage | Termination | Rated Current | Packaging |
| LC | 0805 1206 | M103 = 10 MHz M223 = 22 MHz M473 = 47 MHz M104 = 100 MHz M224 = 220 MHz | M = ± 20% | A = 25 VDC | N = Ni Barrier, Solder Plated | A = 0.1 A (100 mA) | T = Tape and Reel B = Bulk |

Thru-hole Filters High Frequency PCB Filters

The economical High Frequency PCB Filter offers electrical characteristics which allow many devices to meet most government and industry specifications for EMI control, while providing good electrostatic discharge protection.

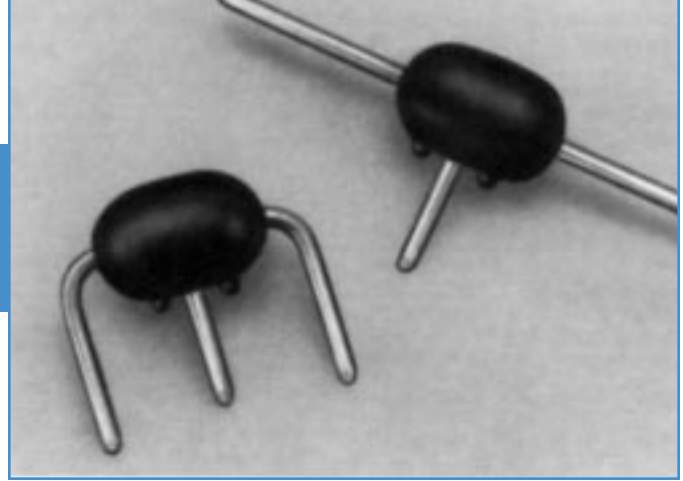
A lossy ferrite filter with a center ground lead is terminated within the filter's thermoset epoxy body.

The High Frequency PCB Filter offers savings three ways. First is the low cost of the filter assembly. Second is the economy of installation. Three silver plated leads are inserted into holes in a printed circuit board which has a ground path circuit, for conventional flows-soldering with other components. No special mounting plate or brackets are needed and when the holes are placed as recommended in a .062 (1.57mm) thick board, no lead trimming is required. Elimination of hand soldering provides opportunities for improved quality in addition to applied-cost benefits.

A third savings results from placing a filter at the source of an EMI problem, potentially eliminating the need for additional filtering at other points in the circuit.

Features

- Provides EMI filtering to protect low power digital circuits - helps equipment meet FCC and VDE specifications
- Mounts directly to printed circuit board with no bracket or plate for lower applied costs - can be flow soldered with other components
- Encapsulated for environmental protection
- Mounts on PCB to begin filtering at the source of the problem
- Built-in standoffs permit cleaning or coating under the filter



Typical Electrical Characteristics

| | |
|--|---|
| <i>Current</i> | Max. 10A DC; 0.3A RF |
| <i>Operating Voltage</i> | Max. 50 VDC, -25°C +85°C |
| <i>Capacitance</i> | 800 pF min. |
| <i>Dissipation Factor</i> | 0.1 Max. |
| <i>Dielectric Withstanding Voltage</i> | 125 VDC for 5 seconds |
| <i>Insulation Resistance</i> | Min. 100 MegOhms at 100 VDC for 2 minutes and 25°C |
| <i>Direct Current Resistance</i> | 0.002 ohms Max. |
| <i>Minimum No-Load Insertion Loss</i> | Per MIL-STD-220 at 25°C; PCB mounted, 50 ohm strip line |
| | 3dB @ 8 MHz |
| | 10dB @ 25 MHz |
| | 15dB @ 50 MHz |
| | 20dB @ 100 MHz-1GHz |

Preformed to Recommended Mounting Configuration Part Number 842448-2

