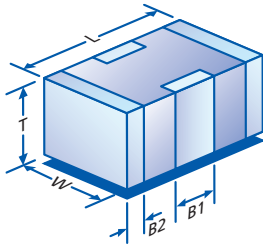


# Surface mount EMI filters - X2Y Integrated Passive Components

## X2Y

Type		E03					
Chip size		0603	0805	1206	1410	1812	2220
Rated voltage	Dielectric	Minimum and maximum capacitance values					
	16Vdc	COG/NPO	150pF	-	-	-	-
X7R		15nF	-	-	-	-	-
25Vdc	COG/NPO	120pF	560pF-820pF	1.8nF-3.3nF	6.8nF-8.2nF	12nF-15nF	22nF-33nF
	X7R	12nF	56nF-68nF	-	470nF	820nF	1.2µF
50Vdc	COG/NPO	10pF-100pF	390pF-470pF	1.2nF-1.5nF	4.7nF-5.6nF	8.2nF-10nF	18nF
	X7R	150pF-10nF	18nF-47nF	56nF-220nF	180nF-400nF	390nF-680nF	560nF-1.0µF
100Vdc	COG/NPO	-	10pF-330pF	22pF-1.0nF	100pF-3.9nF	820pF-6.8nF	1.0nF-15nF
	X7R	-	470pF-15nF	1.5nF-47nF	4.7nF-150nF	8.2nF-330nF	10nF-470nF

Note: For some lower capacitance parts, higher voltage rated parts may be supplied.



	0603	0805	1206	1410	1812	2220
L	1.6±0.2 (0.063±0.008)	2.0±0.3 (0.08±0.012)	3.2±0.3 (0.126±0.012)	3.6±0.3 (0.14±0.012)	4.5±0.35 (0.18±0.014)	5.7±0.4 (0.22±0.016)
W	0.8±0.2 (0.03±0.008)	1.25±0.2 (0.05±0.008)	1.60±0.2 (0.063±0.008)	2.5±0.3 (0.1±0.012)	3.2±0.3 (0.126±0.012)	5.0±0.4 (0.2±0.016)
T	0.5±0.15 (0.02±0.006)	1.0±0.15 (0.04±0.006)	1.1±0.2 (0.043±0.008)	2 max. (0.08 max.)	2 max. (0.08 max.)	2.5 max. (0.1 max.)
B1	0.4±0.15 (0.016±0.006)	0.5±0.25 (0.02±0.01)	0.95±0.3 (0.037±0.012)	1.20±0.3 (0.047±0.012)	1.4±0.35 (0.06±0.014)	2.25±0.4 (0.09±0.016)
B2	0.25±0.15 (0.010±0.006)	0.3±0.15 (0.012±0.006)	0.5±0.25 (0.02±0.01)	0.5±0.25 (0.02±0.01)	0.75±0.25 (0.03±0.01)	0.75±0.25 (0.03±0.01)

Note 1: All dimensions mm (inches).

Note 2: Pad widths less than chip width gives improved mechanical performance.

Note 3: Insulating the earth track underneath the filters is acceptable and can help avoid displacement of filter during soldering.

The Syfer X2Y Integrated Passive Component is a 3 terminal EMI chip device.

When used in balanced line applications, the revolutionary design provides simultaneous line-to-line and line-to-ground filtering, using a single ceramic chip. In this way, differential and common mode filtering are provided in one device.

For unbalanced applications, it provides ultra low ESL (equivalent series inductance). Capable of replacing 2 or more conventional devices, it is ideal for balanced and unbalanced lines, twisted pairs and dc motors, in automotive, audio, sensor and other applications.

Available in sizes from 0603 to 2220, these filters can prove invaluable in meeting stringent EMC demands.

Manufactured in the UK by Syfer Technology Limited under licence from X2Y attenuators LLC.

### Advantages

- Replaces 2 or 3 capacitors with one device
- Ultra low inductance due to cancellation effect
- For balanced lines:  
Matched capacitance line to ground on both lines
- Differential and common mode attenuation
- Effects of temperature and voltage variation eliminated
- Effect of ageing equal on both lines
- High current capability

### Applications

- Single ended/unbalanced lines
- Balanced lines and twisted pairs
- EMI Suppression on dc motors
- Sensor/transducer applications
- Wireless communications
- Audio amplifiers
- CANBUS systems

### Dielectric

X7R or COG/NPO

### Electrical configuration

Multiple capacitance

### Capacitance measurement

At 1000hr point

### Typical capacitance matching

Better than 5%

### Temperature rating

-55°C to 125°C

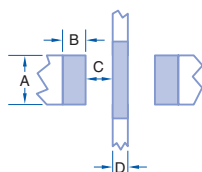
### Dielectric withstand voltage

2.5 x Rated Volts for 5 secs.  
Charging current limited to 50mA Max.

### Insulation resistance

100Gohms or 1000s (whichever is the less)

### Recommended solder lands



	0603	0805	1206	1410	1812	2220
A	0.6 (0.024)	0.95 (0.037)	1.2 (0.047)	2.05 (0.08)	2.65 (0.104)	4.15 (0.163)
B	0.6 (0.024)	0.9 (0.035)	0.9 (0.035)	1.0 (0.04)	1.4 (0.055)	1.4 (0.055)
C	0.4 (0.016)	0.3 (0.012)	0.6 (0.024)	0.7 (0.028)	0.8 (0.03)	1.2 (0.047)
D	0.2 (0.008)	0.4 (0.016)	0.8 (0.03)	0.9 (0.035)	1.4 (0.055)	1.8 (0.071)

# Surface mount EMI filters - X2Y Integrated Passive Components

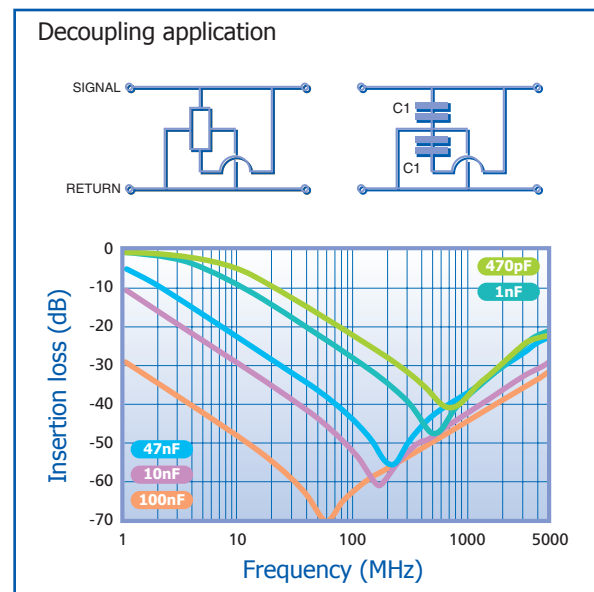
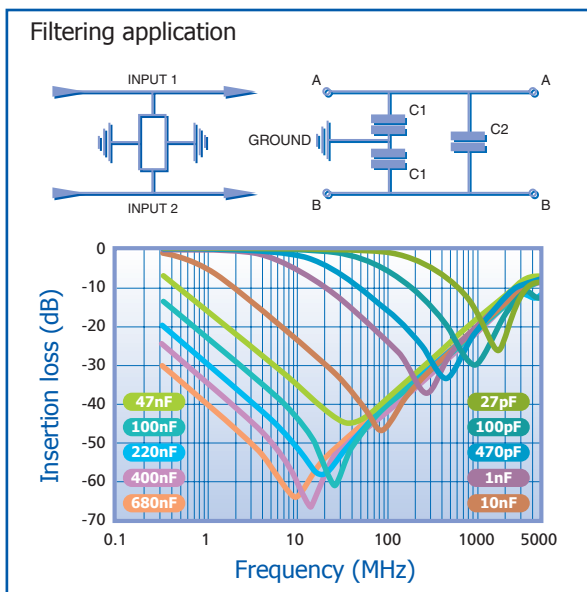
The internal structure furnishes a reduced inductance when compared to that of a conventional capacitor. This is a result of the novel internal electrode structure which inherently reduces the inductance by the cancellation effect of opposing currents in close proximity. The capacitance line to ground (common mode) is closely matched due to the symmetry within the design. As the device includes line to ground capacitance for both lines, any temperature, ageing and voltage effects will have an equal influence on both lines therefore maintaining balanced decoupling.

Because the part acts as a de-coupling device, the current

limitations of a standard 3 terminal chip do not apply. The single line 3 terminal feedthrough chip carries the signal current through the very thin feedthrough electrodes within the device which have limited dc resistance and so can cause excessive heating, hence the maximum permissible current is often limited to around 300mA for a 1206 device. The Integrated Passive Component is in by-pass across two lines and so is unaffected by high signal currents.

The table below offers a comparison of de-coupling devices and demonstrates how the Integrated Passive Component extends the options for EMC circuit protection.

Component	Advantages	Disadvantages	Applications
Chip capacitor	Industry standard	Requires 1 per line High inductance Capacitance matching problems	By-pass Low frequency
3 terminal feedthrough	Feedthrough Lower inductance	Current limited	Feedthrough Unbalanced lines High frequency
Syfer X2Y Integrated Passive Component	Very low inductance Replaces 2 (or 3) components Negates the effects of temperature, voltage and ageing Provides both common mode and differential mode attenuation Can be used on balanced & unbalanced lines	Care must be taken to optimise circuit design	By-pass Balanced lines High frequency dc electric motors Unbalanced lines Audio amplifiers CANBUS



## Ordering information

1812	Y	100	0334	M	X	T	E03
Chip Size	Termination	Voltage	Capacitance in picofarads (pF) C <sub>1</sub>	Tolerance	Dielectric	Packaging	Type
0603 0805 1206 1410 1812 2220	J = Nickel barrier Y = FlexiCap™ A = (Tin/lead) H = FlexiCap™ (Tin/lead)	16 = 16Vdc 25 = 25Vdc 50 = 50Vdc 100 = 100Vdc	First digit is 0. Second and third digits are significant figures of capacitance code.  The fourth digit is number of zeros following  Example: 0334=330nF. Note: C <sub>1</sub> = 2C <sub>2</sub>	M = ±20%	C = COG/ NP0 X = X7R	T=178mm (7") reel R=330mm (13") reel B = Bulk	Syfer X2Y Integrated Passive Component

## Reeled quantities

178mm (7") reel	<b>0603</b>	<b>0805</b>	<b>1206</b>	<b>1410</b>	<b>1812</b>	<b>2220</b>	330mm (13") reel	<b>0603</b>	<b>0805</b>	<b>1206</b>	<b>1410</b>	<b>1812</b>	<b>2220</b>
	4000	3000	2500	2000	1000	1000		16000	12000	10000	8000	4000	4000