

# Surface Mount EMI Filters - E03 X2Y Integrated Passive Components

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 0805 to 1812, these filters can prove invaluable in meeting stringent EMC demands.

Manufactured by Knowles Capacitors under licence from X2Y Attenuators LLC.



## Dielectric

X7R or COG/NP0

## Electrical configuration

Multiple capacitance

## Capacitance measurement

At 1000hr point

## Typical capacitance matching

Better than 5%  
(down to 1% available on request)

## Temperature rating

-55°C to 125°C

## Insulation resistance

100Gohms or 1000s (whichever is the less)

## Dielectric withstand voltage

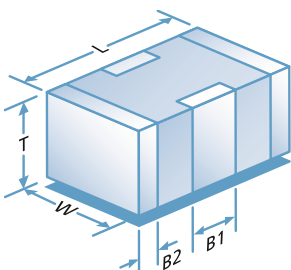
≤200V 2.5 times rated Volts for 5 secs  
500V 1.5 times rated Volts for 5 secs  
Charging current limited to 50mA Max.

| Type          |            | E03           |               |               |               |
|---------------|------------|---------------|---------------|---------------|---------------|
| Chip size     |            | 0805          | 1206          | 1410          | 1812          |
| Rated voltage | Dielectric |               |               |               |               |
| 16Vdc         | COG/NP0    | -             | -             | -             | -             |
|               | X7R        | -             | -             | -             | -             |
| 25Vdc         | COG/NP0    | 560pF - 820pF | 1.8nF - 3.3nF | 6.8nF - 8.2nF | 12nF - 15nF   |
|               | X7R        | 56nF - 68nF   | -             | 470nF         | 820nF         |
| 50Vdc         | COG/NP0    | 390pF - 470pF | 1.2nF - 1.5nF | 4.7nF - 5.6nF | 8.2nF - 10nF  |
|               | X7R        | 18nF - 47nF   | 56nF - 220nF  | 180nF - 400nF | 390nF - 680nF |
| 100Vdc        | COG/NP0    | 10pF - 330pF  | 22pF - 1.0nF  | 100pF - 3.9nF | 820pF - 6.8nF |
|               | X7R        | 470pF - 15nF  | 1.5nF - 47nF  | 4.7nF - 150nF | 8.2nF - 330nF |
| 200Vdc        | COG/NP0    | -             | 22pF - 1.0nF  | 100pF - 3.3nF | 820pF - 5.6nF |
|               | X7R        | -             | 820pF - 33nF  | 1.2nF - 120nF | 2.7nF - 180nF |
| 500Vdc        | COG/NP0    | -             | -             | -             | 820pF - 3.9nF |
|               | X7R        | -             | -             | -             | 2.7nF - 100nF |

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

## AEC-Q200 range (E03) - capacitance values

| Chip size |         | 0805          | 1206          | 1410          | 1812          |
|-----------|---------|---------------|---------------|---------------|---------------|
| 50Vdc     | COG/NP0 | 390pF - 470pF | 1.2nF - 1.5nF | 4.7nF - 5.6nF | 8.2nF - 10nF  |
|           | X7R     | 18nF - 33nF   | 56nF - 150nF  | 180nF - 330nF | 390nF - 560nF |
| 100Vdc    | COG/NP0 | 10pF - 330pF  | 22pF - 1.0nF  | 100pF - 3.9nF | 820pF - 6.8nF |
|           | X7R     | 470pF - 15nF  | 1.5nF - 47nF  | 4.7nF - 150nF | 8.2nF - 330nF |

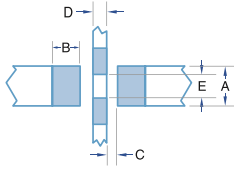


|    | 0805                   | 1206                   | 1410                    | 1812                    |
|----|------------------------|------------------------|-------------------------|-------------------------|
| L  | 2.0±0.3 (0.08±0.012)   | 3.2±0.3 (0.126±0.012)  | 3.6±0.3 (0.14±0.012)    | 4.5±0.35 (0.18±0.014)   |
| W  | 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)   |
| T  | 1.0±0.15 (0.04±0.006)  | 1.1±0.2 (0.043±0.008)  | 2.0 max.<br>(0.08 max.) | 2.1 max.<br>(0.08 max.) |
| B1 | 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)   |
| B2 | 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)   |

- Notes: 1) All dimensions mm (inches).  
2) Pad widths less than chip width gives improved mechanical performance.  
3) The solder stencil should place 4 discrete solder pads. The un-printed distance between ground pads is shown as dim E.  
4) Insulating the earth track underneath the filters is acceptable and can help avoid displacement of filter during soldering but can result in residue entrapment under the chip.

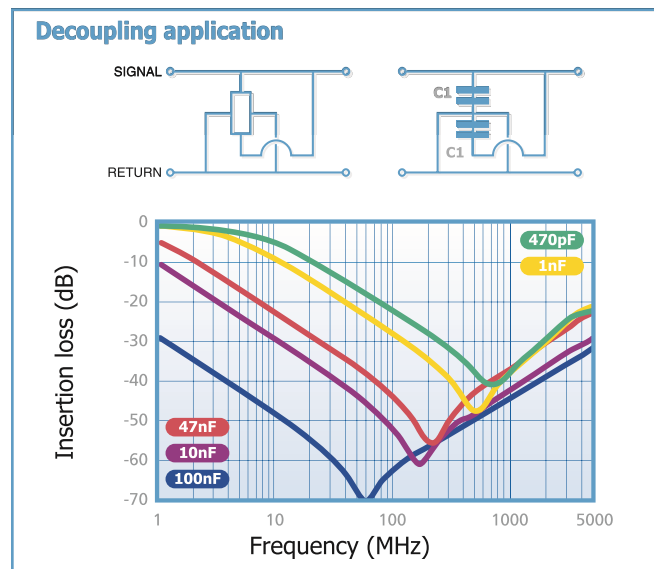
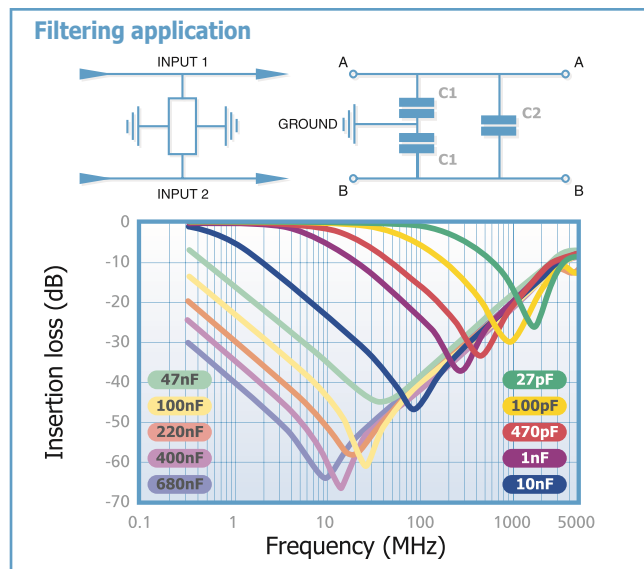
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## Recommended solder lands



|   | 0805         | 1206        | 1410         | 1812         |
|---|--------------|-------------|--------------|--------------|
| A | 0.95 (0.037) | 1.2 (0.047) | 2.05 (0.08)  | 2.65 (0.104) |
| B | 0.9 (0.035)  | 0.9 (0.035) | 1.0 (0.040)  | 1.4 (0.055)  |
| C | 0.3 (0.012)  | 0.6 (0.024) | 0.7 (0.028)  | 0.8 (0.031)  |
| D | 0.4 (0.016)  | 0.8 (0.031) | 0.9 (0.035)  | 1.4 (0.055)  |
| E | 0.75 (0.030) | 1.0 (0.039) | 1.85 (0.071) | 2.05 (0.080) |

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



## Ordering Information - X2Y IPC range

| 1812                         | Y                                                                                                                                                        | 100                                                                           | 0334                                                                                                                                                                                                        | M                                                             | X                                                                  | T                                                       | E03                                    |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------|
| Chip Size                    | Termination                                                                                                                                              | Voltage                                                                       | Capacitance in picofarads (pF)<br>C <sub>1</sub>                                                                                                                                                            | Tolerance                                                     | Dielectric                                                         | Packaging                                               | Type                                   |
| 0805<br>1206<br>1410<br>1812 | J = Nickel Barrier (Tin)<br>*Y = FlexiCap™ (Tin - X7R only)<br>A = (Tin/Lead)<br>Not RoHS compliant.<br>*H = FlexiCap™ (Tin/Lead)<br>Not RoHS compliant. | 016 = 16V<br>025 = 25V<br>050 = 50V<br>100 = 100V<br>200 = 200V<br>500 = 500V | First digit is 0. Second and third digits are significant figures of capacitance code.<br>The fourth digit is number of zeros following<br>Example: 0334 = 330nF.<br>Note: C <sub>1</sub> = 2C <sub>2</sub> | M = ±20%<br>(Tighter tolerances may be available on request). | A = C0G/NP0 AEC-Q200<br>C = C0G/NP0<br>E = X7R AEC-Q200<br>X = X7R | T = 178mm (7") reel<br>R = 330mm (13") reel<br>B = Bulk | Syfer X2Y Integrated Passive Component |

Note: \*FlexiCap™ termination only available in X7R material. Please contact the sales office for any special requirements.

## Reeled quantities

| 178mm (7") reel | 0805 | 1206 | 1410 | 1812 | 330mm (13") reel | 0805  | 1206  | 1410 | 1812 |
|-----------------|------|------|------|------|------------------|-------|-------|------|------|
|                 | 3000 | 2500 | 2000 | 1000 |                  | 12000 | 10000 | 8000 | 4000 |



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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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