This presentation will provide an overview of KEMET Electronics’ new series of AC Line Filters. Our objectives are to define the role an AC line filter plays in an electronic circuit and to present the features and benefits of each KEMET AC line filter offering.
AC Line Filters are components used to suppress “noise” generated in a circuit, typically from semiconductors switching on and off. This noise is called electro-magnetic interference, or EMI, which has two types of emissions: radiation and conduction. AC Line Filters suppress conduction noise.

There are international regulations governing the control of electro-magnetic interference to ensure that electronics work well together. This is why we are asked to turn off our cell phones when visiting a hospital or place them in airplane mode when flying. Extra precautions are taken to control any interference between our cell phones and pace makers or traffic control towers, for example.

Components such as capacitors and inductors can reduce EMI emissions. AC Line filters are designed specifically for use in AC Line systems, like AC to DC power supplies found in many home or office electronics.

Depicted are two graphs of EMI noise before filtering and after filtering. The blue line shows the actual electrical energy. The red and pink lines show the regulation limits for those signals. On the left we can see part of the blue is above the limit lines while on the right, after filtering is applied, all of the energy is below the limit lines.
There are two conduction modes that can generate noise. They are Differential Mode (sometimes referred to as “Normal” Mode) and Common Mode.

AC line filters are primarily used to suppress Common Mode noise. Often, in addition to an AC line filter (which is sometimes referred to as a coil or choke), you’ll find safety-rated X/Y capacitors used in conjunction, as shown in this filter lay-out.

This picture shows where the common mode inductor would be located. It should be noted that in this diagram the common mode inductor is one physical piece, even though it might look like it was drawn as two. In this particular example, a differential mode AC Line Filter has not been drawn.
Coils with 4 pins as shown in the KEMET SCR series picture are Common Mode AC Line Filters (or coils). Normal Mode coils have only 2 pins.
This page and the next will review each of our Common Mode AC Line Filter series; noting the AC current and voltage ratings of each, as well as inductance, DC resistance and dimensions.
Specific application information is provided next to the picture. This will help with the design-in process.
While the Common Mode series covered in the previous two slides are our focus products, here are more options to consider. These Differential Mode filters are available if a customer needs a Differential Mode coil or a general purpose high frequency inductor with high voltage ratings.
Applications for AC Line Filters are extensive. Electromagnetic interference is emitted from all home appliances, computers, cell phones – anything that plugs into a wall. And in every case, EMI suppressors like AC line filters are required. Generally if a customer is designing in a X or Y safety-rated EMI filter capacitor, they will need an AC line filter as well.
EMI components are a $2.2 billion dollar business, globally. AC Line Filters account for about $350 million of that total. NEC TOKIN’s portion is $32 million. Standard lead time is 12 weeks. A list of competitors is provided on this slide.
Summary

- KEMET Electronics’ AC Line Filters are a subset of new EMI suppression components released in 2013.

- Other EMI offerings from KEMET include EMI cores, flex suppressor sheets, power inductors and X/Y safety-rated capacitors.

- With a number of form factors available to cover a broad range of applications, you are sure to find the right AC line filter for noise attenuation.