

COMMON-MODE FILTERS FOR DC/DC CONVERTERS

Switching noise generated from a DC/DC converter appears at both the input and output terminals. The parasitic capacitance of the power transformer, printed circuit board (PCB) and case will couple voltage “spikes” between input and output. The spike generator in a DC/DC converter can be identified as the leakage inductance of the transformer, output diode reverse recovery time, etc. A common-mode filter can reduce common-mode noise at either the input or output section of a DC/DC converter (see Figure 1).

A common-mode filter placed at the output of a DC/DC converter can reduce the output common-mode noise, as well as, the output ripple to less than 5mV, which is equivalent

to that of a linear regulator ripple. For high-speed analog circuits such as A/D converters, op-amps, S/H, D/A converters, high-speed CMOS, a common-mode filter at the output is highly recommended.

A common-mode filter at the input of a DC/DC converter is needed only to reduce common-mode noise and reflected ripple from the DC/DC converter to the DC source.

In practice, design engineers use high-voltage capacitors between input and output from 1,000pF to 6,800pF to couple the unwanted noise to either input or output ground. The input to output capacitor reduces the AC impedance of the converter as well the common-mode noise.

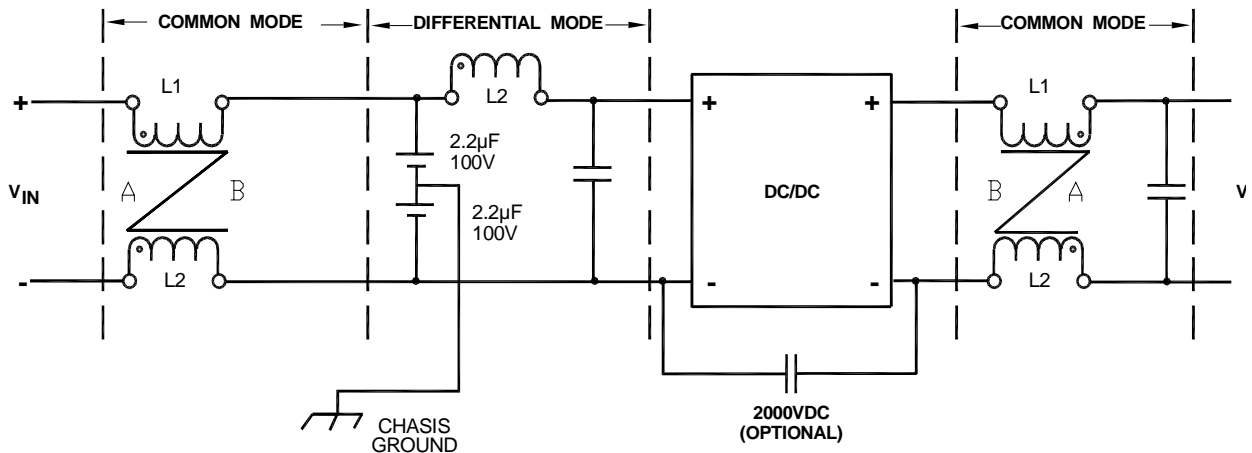


FIGURE 1

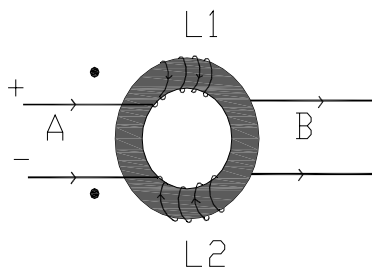


FIGURE 2. The common mode inductor