



Common Mode Chokes Webinar Questions and Answers

Q: The differential mode impedance is caused by leakage inductance. The leakage inductance prevents complete flux cancellation. This can lead to core saturation for high currents. Do you have any information on this?

A: Typically this is not an issue. With respect to a power line, the incomplete flux cancellation would only be for AC components of the delivered power and not for the DC component. With respect to a signal line, they are small signal, with no real power, and the frequency of the signal should be outside of the differential impedance.

Q: What is the load and source model for attenuation and impedance curves?

A: We don't use or generate models to generate our impedance and attenuation curves. This is all measured data at room temperature. The impedance and attenuation curves are all measured with reference to 50 ohms.

Q: Doesn't EMI filter design involve common mode chokes as well as X caps and Y caps? How do I select those?

A: If you need to design 2nd order and above filters using a common mode choke, please refer to our [Application Note Common Mode Filter Design Guide \(Doc #191\)](#).

Q: How does a choke's inductance affect the impedance control in a communication line?

A: Impedance and inductance are related by $Z = 2\pi f L$ at low frequency bands. In a communication line application, impedance is limited by parallel internal resistance of the choke. Our tools can help you identify typical impedance in the spectrum of concern. Our [DFT7160-513](#) is a great example of this where the slope of the impedance follows $2\pi f L$ up to a flattening where the slope changes due to the parallel resistance. We don't model this parallel resistance due to the severe difficulty and complexity of the model. We measure s-parameters to provide accurate representation of performance.

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Q: Do you consider the amount of common mode current expected to see when sizing the common mode choke or is it just sized based on the amount of differential current expected? Could the amount of common mode current saturate the common mode choke and effect its performance?

A: We only use differential current. Higher magnitude common mode current can cause saturation. Please contact us directly so we may assist you with your particular application.



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Q: Does frequency response shift with current draw?

A: No. This would imply saturation and that is typically not the case.

Q: For High Current CM for Automotive (>25A), would it make sense to have the windings made from multifilar twisted windings?

A: It could if it makes sense. It is all about a balance of performance, manufacturing and material costs.

Q: Is the attenuation/impedance over frequency affected by temperature?

A: Yes, it is. This is all dependent on the material properties of the design.

Q: What is the effect of “Y” capacitors on input and output of CMM chokes?

A: Please refer to our [Application Note Common Mode Filter Design Guide \(Doc #191\)](#).

Q: How is the impedance calculated to attenuation?

A: It is measured. Not calculated. Measured with reference to 50 ohms.

Q: Does a common mode choke need common mode capacitance to achieve the attenuation?

A: No. Common mode chokes work as single pole filters. Additional poles can be added as required. Please refer to our [Application Note Common Mode Filter Design Guide \(Doc #191\)](#).

Q: Does the program work with the low outgassing chokes for space applications?

A: No. If you need specific measurements for [Coilcraft Critical Products and Services](#) components, please contact us directly so we can measure those for you.

Q: What are the tolerances on these chokes?

A: For this type of product, the industry standard is to only specify minimum inductance. Please refer to the specific datasheet of the component you are interested in.

Q: Why don't we want differential impedance in our area of interest? Is it only specified for data line? If I have both CM and DM noise issue, should we consider a common mode choke that has better DM and DM attenuation?

A: You don't want differential impedance in the spectrum where the signal exists.



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Q: Any suggestion about X cap and Y cap before or after common mode choke for reducing emission compared to improving immunity against external disturbance?

A: Please refer to our [Application Note Common Mode Filter Design Guide \(Doc #191\)](#).

Q: Did the simulation consider Temperature?

A: No. Please keep in mind these are measurements, not simulations. However, temperature is not considered in the results.

Q: Do you have spice models for your common mode chokes and do you show results of how they compare to the datasheets?

A: We do not have common mode choke Spice models. However, we can supply s-parameters.

Q: Is there an effect on a common mode choke when conformal coating is applied?

A: While many Coilcraft parts may be potted, it is difficult to generalize about the possible effects of potting or coating. Potential considerations include differing thermal expansion coefficients of the potting compound vs. the inductor materials and changes in overall inductance and capacitance of the potted component vs. the original component.

Coilcraft does not test the effects of conformal coating. We recommend testing your specific material, process, and application conditions to determine the effects of any proposed potting material.

Q: Can you tell us more about shielded vs unshielded? When to use each?

A: Shielding is not a typical concern with CM chokes. They are magnetically shielded by design – either toroid core or other closed magnetic path design.

These CMC designs are H-field shielded due to the closed flux path of the magnetic material. For E-Field shielding, a majority of our users have found the shield cans around the entire circuit including the CMC is commercially more attractive than individual components with E-field shields.

Q: Are these common mode chokes supporting the lower band of the frequency?

A: The frequency band is part number specific. Use our [MAGPro® Common Mode Choke Finder and Analyzer](#) for specific applications.

Q: Is it a way to estimate the differential inductance gained with the CMC?

A: We do not attempt to estimate that. We do typically show the DM impedance and/or attenuation vs frequency on the datasheets and in the [MAGPro® Common Mode Choke Finder and Analyzer](#) for specific applications.