

Inductors in modern circuits

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Scope

Inductors are indispensable in modern electronics (power electronics). They are used in various applications to ensure interference-free operation with high efficiency. The main tasks of inductors include suppressing electromagnetic interference, reducing output ripple, and enabling nearly “lossless” generation of different voltage levels (buck/boost).

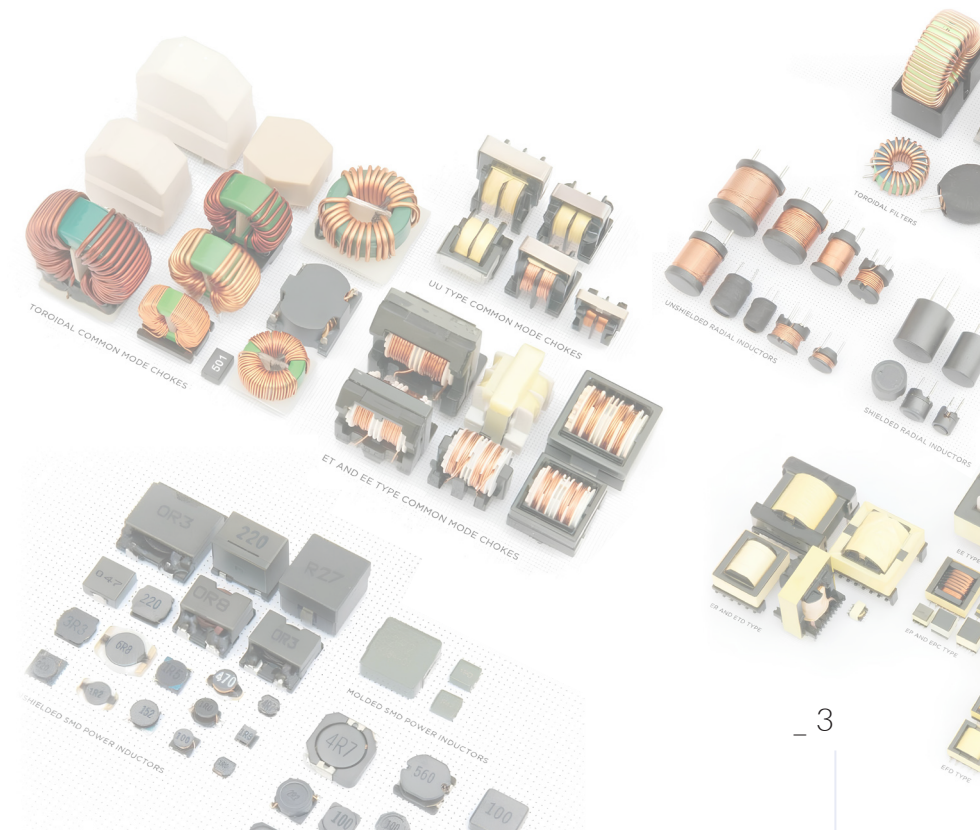
In the coming months, we will provide you with an overview of the sensible use of various components to help you achieve your goals in circuit design. In many cases, there will be multiple ways to achieve your objectives using different components. Often, space constraints, power loss, EMC, or price are the driving factors for choosing a specific product. Compromises are often necessary, so we will also highlight the advantages and disadvantages of different products (e.g., resistance, remagnetization losses).

Some components can be used for different purposes. For example, storage chokes can be used for EMC, smoothing, and switching tasks! More on this later.

Component overview

Before we describe each component group in detail, here is a brief overview of the topics:

- Storage chokes
- Common Mode Chokes
- Switching power supply transformers (Forward, Half-Bridge, Full-Bridge, etc.)
- Ethernet transformers
- RF components
- (Special designs such as WPC)



Storage Choke / Push-Pull Choke

A simple yet very interesting component. The simplest form of an inductor consists of a wound conductor (air coil). In most applications, the coil is wound on a core. The core increases inductance, reducing space and material (copper) requirements. This storage inductor can be used in various circuits. As a storage choke, it adapts the input voltage to the required output voltage, achieving efficiencies of up to 97%.

Additionally, an inductor can reduce ripple voltage. Another function is reducing high-frequency signals on the line. However, this also attenuates any necessary signals.



Common Mode Choke

This consists of two (or more) windings on a core, wound in opposite directions. These inductors are used to reduce common-mode interference. Such interference enters through both lines in the same direction, and the choke ideally cancels out this noise.

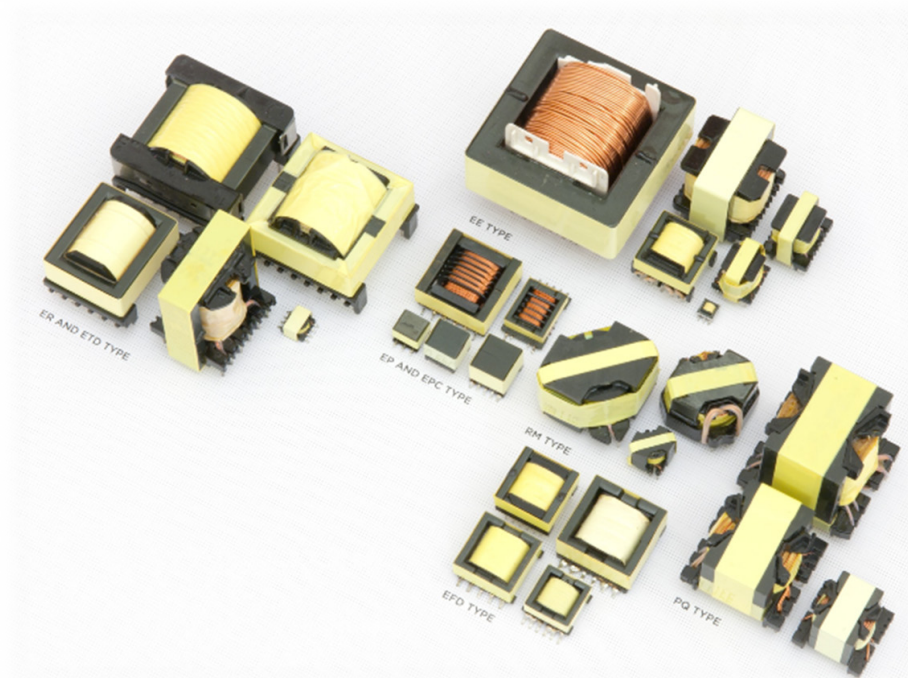
The equivalent circuit of this choke also includes a series inductance, explaining why a common-mode choke also affects differential-mode interference.

There are different winding methods for Common Mode Chokes. Sectional winding and bifilar winding can be interesting depending on the application, as bifilar windings provide lower common-mode attenuation (left of the attenuation peak).



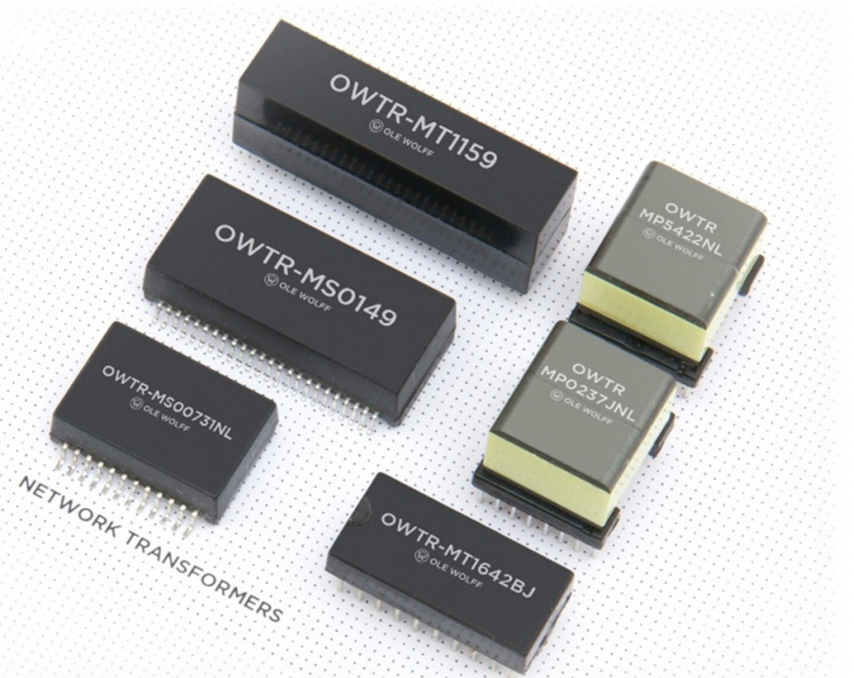
Switching power supply transformers

For higher power levels (from approx. 250 W onward), circuit topologies such as forward, half-bridge, or full-bridge are used. Additionally, for power levels above 75 W, PFC (Power Factor Correction) is required.



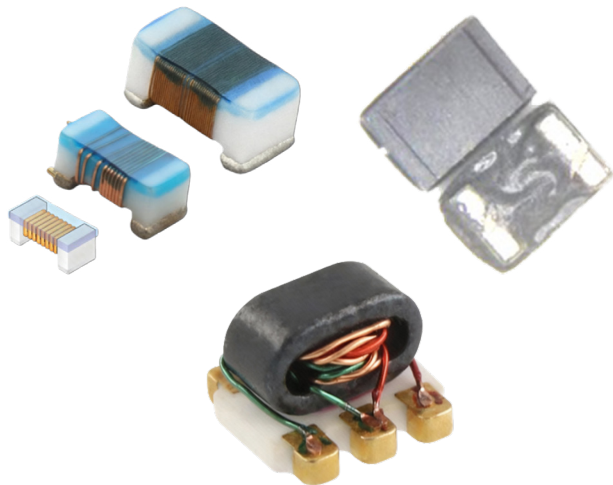
Ethernet transformers

Many devices today are equipped with an Ethernet interface. There are various transformers that can be used here. We will present different components that can, according to your requirements, also be integrated into larger housings (up to 50 pins) for dual or quad connectors.



RF components

For many applications in radio and very high-data-rate designs, it is necessary to rely on other materials or even on air-core coils. Here, we will show you interesting components such as inductors and matching elements (e.g., baluns).



Miscellaneous

Here you have the opportunity to ask us questions and share your ideas on interesting topics.
We look forward to your suggestions.

We look forward to sharing more interesting information about inductors in the coming months. We also aim to support you with cost-effective components for your projects.

You can source Ole Wolff components from various distributors (**Bürklin, Digikey, and more to follow**). Samples for your projects can also be requested directly from us by providing project details.

We can help you

Please contact your local representative or reach out directly at:

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We wish you all the best until next time at Ole Wolff.
