

INDUCTORS, AIR CORE INDUCTORS, AND BALUNS



In other blogs, we've talked about inductors in terms of their role in lumped element filters. Here, we're going to take a step back to discuss inductors and related passive electronic components, including air core inductors and baluns.

Inductors

These passive electrical components are designed to store energy in the form of a magnetic field, and we define them by their inductance, measured in Henries (H). Inductors take the form of a coil of wire wound around a magnetic core.

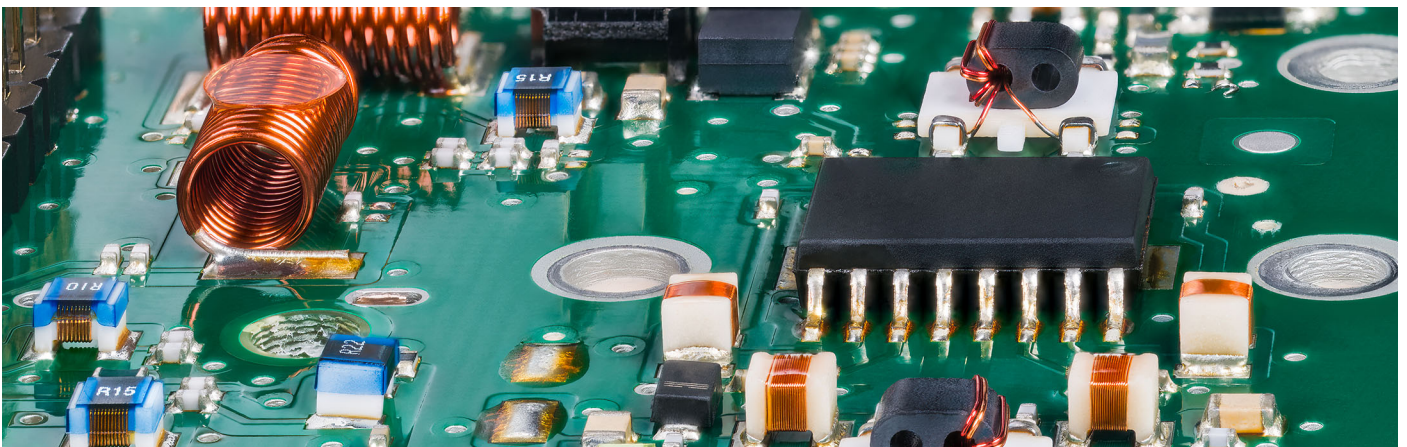
Inductors filter out high-frequency noise and minimize changes in current in power supplies, radio frequency (RF) circuits and audio circuits. Their resistance to current change makes them useful for designing filters, tuning circuits, and when paired with capacitors, smoothing out signals.

Air Core Inductors

Sometimes referred to as an air core coil, an air core inductor is an insulated coil with nothing but air and windings in its core. These are typically deployed in RF circuits because of their low-loss characteristics.

Advantages of Air Core Inductors

- **Absence of Nonlinearities:** The inductance of an air core inductor doesn't change in response to applied current or voltage because air doesn't exhibit nonlinear magnetic properties.
- **Absence of Saturation:** Unlike ferromagnetic materials (e.g., iron, nickel, cobalt), air does not saturate. This means the inductance of an air-core inductor does not decrease significantly at high current levels.
- **High Q Factor:** Because air core inductors have no solid core material, there are no energy losses due to hysteresis or eddy currents, which makes their Q factor (a measure of efficiency) high.



Baluns

These electrical transformers are designed to maintain balance. Baluns can convert between a balanced signal and an unbalanced signal. A balanced signal is one where there are equal voltages on two lines with opposite phases; an unbalanced signal refers to a single voltage on one line. A common example is radio and television antenna systems, where baluns help connect a balanced antenna to an unbalanced feed line (e.g., coaxial cable).

Baluns take many forms. For example, some baluns feature an impedance matching network, so they can match the impedance between the source and the load. This application is important in RF, where impedance mismatches can cause reflections and reduce system efficiency.

For more information on our air core inductor offerings and custom solutions, see our [product page](#).

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