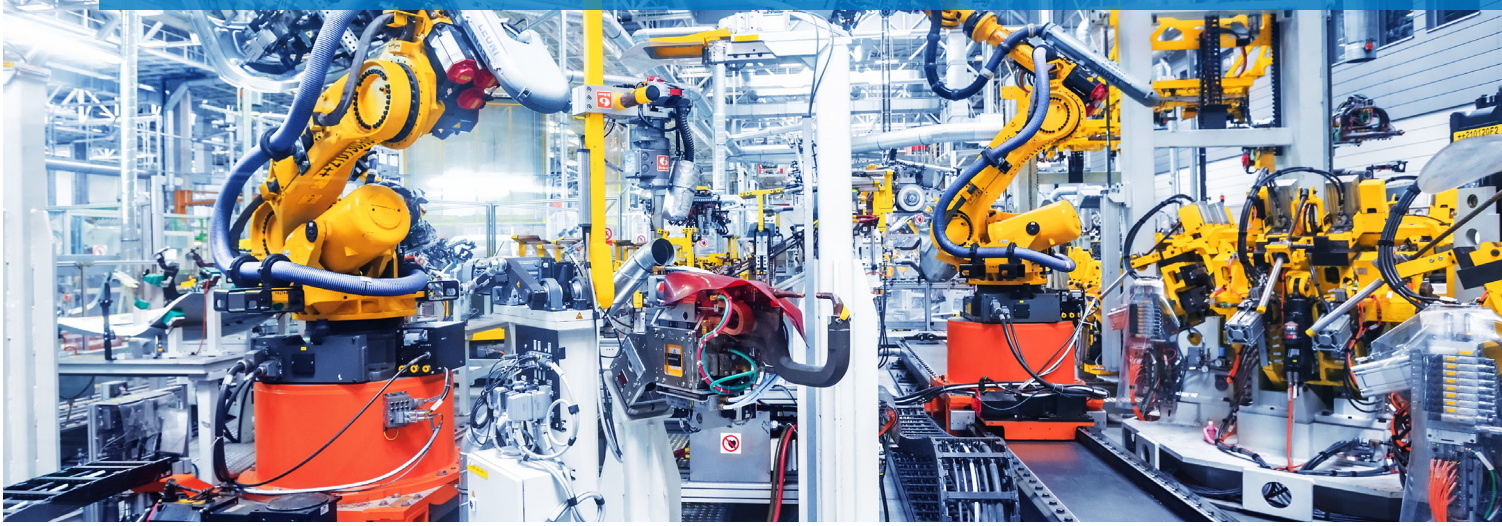
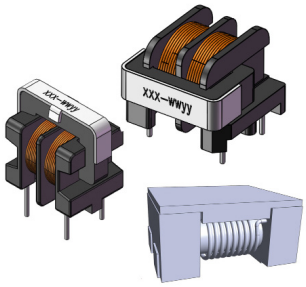
Use case
Eaton common-mode (ECM) chokes





Eaton provides noise filtering in high-frequency and power circuits

Electrical noise or EMI is a frequent challenge for engineers designing high-frequency electronic products and powerline circuits. Although noise problems have been around for a long time, it is further exacerbated with the exponentially growing number of electrical and electronic devices, as well as the increasing reliance on wireless communications. Two main forms of electrical noise include conducted EMI (electrical disturbances produced by inadvertent physical contact of conductors) and radiated EMI, which is caused by inductive coupling between circuit elements in close proximity. Whatever the form, EMI interferes with the operation of devices and equipment, often resulting in equipment malfunction, latent or catastrophic failures, and costly downtime on operations at industrial and commercial facilities.

Mitigating electrical noise in modern applications

Magnetic components such as inductors and chokes can provide EMI filtering in electric circuits. Common-mode chokes are magnetic elements that block high-frequency noise common to two or more data or power lines, while allowing a specified low-frequency DC signal to pass through. In contrast to differential mode (DM) disturbances, common-mode (CM) noise refers to electrical noise that flows in the same direction in a pair of lines. Some common sources include differences in potential between grounds, stray RF signals, power inverters, and DC switching of motors. Conducted noise in power lines can also interfere with radio and TV reception.

Some essential considerations for selecting CM chokes include high power density, high current ratings, as well as a wide range of impedance and inductance values. These factors all depend on the amount of noise attenuation required, frequency range, and current handling specifications. Due to rapid miniaturization and space constraints in modern applications such as IoT devices, wearables, and portable consumer electronics, electronic components must be small enough to fit into component-dense PCBs. Thus, CM chokes with small footprints are ideal.

Eaton's magnetic solutions for noise filtering

Eaton ECM (Eaton Common Mode) chokes are suitable for high-performance EMI filtering in various industrial, energy, medical, and consumer applications. Examples include Industrial IoT equipment, motion controls, smart meters, solar/wind generators, charger controllers, diagnostic equipment, remote monitoring, high-tech consumer products, and battery-powered devices. The ECM product line comprises two families; the ECMT (through-hole common-mode chokes) and ECMS (surface-mount common-mode chokes). Eaton's ECM products offer high impedance and inductance values in a robust construction for low EMI and high-voltage isolation. Eaton ECMS have current ratings of up to 15 A and are magnetically shielded, providing common-mode noise suppression of up to 100 mHz. The ECMT family has inductance values of up to 85 mHz, capable of achieving noise attenuation over a wide range of frequencies. Eaton ECM is rated from -40 °C up to +125 °C operating temperatures.

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