

Use case

Eaton EXLA high-performance inductors for vehicle electrification



Eaton's high-performance inductors enhance vehicle electrification



Modern personal and commercial vehicles are becoming increasingly electrified, offering a slew of features that improve driveability, vehicular reliability, and driver safety, as well as the overall reliability of automobiles. With increasingly efficient electrical components, automakers are saving on production costs and mitigating the impact of road transport on the environment.

As an example, fuel efficiencies of combustion engines typically fall between 17% to 21%, while electric vehicle engines can achieve up to 90% efficiency. The main reason is that electrically powered systems can be optimized more readily. Vehicle electrification also allows automakers to significantly lower the number of mechanical and hydraulic systems (which typically take up more space).

With an increasing number of electronic components being integrated into modern automobiles, electromagnetic noise is becoming a more significant concern for engineers and designers. EMI emissions in automobiles are broadly classified into "broadband" and "narrowband" EMI. Broadband EMI is generated from automotive components that "arc and spark," such as ignition systems and electric motors; narrowband EMI is formed by other active electronics throughout the vehicle.

To protect electronics from EMI, automotive components must meet stringent EMC standards. Additionally, these components must be sufficiently lightweight and capable of performing reliably under high-temperature conditions typical under the hood.

Inductors are some of the most common EMI filtering elements in today's automobiles. They are typically used in tandem with capacitors to block high-frequency noise signals. One of the most efficient iterations - the molded type - is designed by compacting or molding magnetic shielding material around a coil and lead frame to form the inductor. Their unique construction is ideal for higher power density operation with better thermal dissipation characteristics.

Eaton offers a broad portfolio of automotive-grade components for vehicle electrification. Eaton EXLA1V high-performance molded inductors are suitable for several automotive applications, including LED lighting, ADAS, adaptive cruise control (ACC), collision avoidance, infotainment, cluster electronics, Battery

Management Systems, electric pumps, motor control and auxiliaries, powertrain control modules (PCU), engine control modules (ECM), and electronic control units (ECU). EXLA1V inductors are AECO-200 Grade1 tested for automotive and high-reliability applications and offer a wide range of inductance values from 0.18 μ H to 22 μ H. The robust molded construction of the EXLA1V is ideal for high currents requiring low saturation and stability across a wide temperature range (-55 °C to +155 °C).

The EXLA1V is magnetically shielded for EMI immunity from noise frequencies up to 1 MHz. They are designed using superior powder core materials and advanced manufacturing processes to achieve up to 30% better current ratings, soft saturation, and up to 50% lower DCR than other similar offerings.

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