

Use case

Eaton's Versa-Pac automotive (VPA) family



Eaton configurable magnetics offer reliable operation in automotive applications



Increasing vehicle electrification is enabling an assortment of functions and features that enhance the driving experience as well as the safety and reliability of modern vehicles. According to McKinsey & Company¹, this trend will play a key role in the transformation of the mobility industry. Regulations for carbon emission reduction will bolster this trend with the largest automotive markets set to shift to fully electric vehicles by 2035.

Magnetic solutions play critical roles in modern vehicle electrification. Some of the most essential components include power inductors and transformers, which are utilized in a wide range of applications (such as electronic control units (ECUs), DC-DC converters, in-vehicle infotainment (IVI), Battery Management systems,

and more). These products are designed using low-loss, heat-resistant magnetic materials and are offered in a variety of configurations to optimize performance, cost, and size.

Automotive safety standards, such as the AEC-Q200 qualification, are valued by leading automakers for high reliability and stable performance in magnetics across a wide range of operating temperatures. Other requirements include higher frequencies (greater than 1 MHz) for higher power with low losses and a wide inductance range to support multiple power levels throughout the vehicle. Automotive electronics also need to be sufficiently small and lightweight for seamless integration into component-dense PCBs.

Configurable magnetic

products allow engineers to utilize the same bobbin and core structure to create thousands of configurations and provide flexibility for designers to create custom magnetic solutions (like inductors and transformers) by connecting winding terminals on the PCB in series or parallel.

Eaton's Versa-Pac Automotive (VPA) family is AEC-Q200 qualified for high reliability. The VPA is an extension of Eaton's commercial-grade Versa-Pac (VP Family). The VP/VPA are configurable magnetics that can be used to design inductors, coupled inductors, and transformers for virtually any application; flyback, buck/boost, push-pull, forward, full & half-bridge, SEPIC, and more. They have a wide range of inductance offerings (VP 3 μ H to 200 μ H, VPA 3 μ H to 87 μ H) each winding, 500 V isolation

voltage, high operating frequency (> 1MHz), and a wide operating temperature range (- 40 °C to + 125 °C).

In automotive applications, Eaton's VPAs can be used in DC-DC converters, as they require several multiphase inductors. Each VPA contains six individually tightly wound coils or windings sharing the same ferrite core. Eaton's VPA is ideal for use in multiple areas of the vehicle, e.g., LED lighting, inverters in electric vehicles, on-board chargers (OBCs), wireless chargers, and battery management systems (BMS). Other applications include infotainment systems, HVAC, and motor controls.

1. [2023 Why the Automotive Future is Electric](#)

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