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PMIC Integrates Power And Safety For Traction Inverters

[Infineon Technologies'](#) TLE9744QK OPTIREG PMIC is designed for high-voltage traction inverter applications in electric and hybrid vehicles. It consolidates complete power-supply functions, resolver excitation, and a dedicated safety engine into a single device. This simplifies traction inverter electronic control unit (ECU) design and addresses the complex challenge of supplying multiple isolated power rails for microcontrollers, communication modules, and sensors.

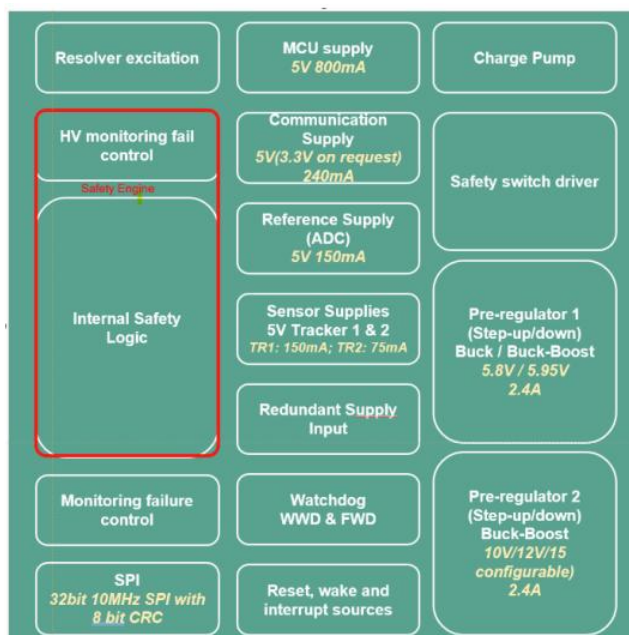
By replacing multiple discrete components with this single-chip solution, the TLE9744QK directly reduces system cost and complexity. According to the vendor, this integration significantly lowers the bill-of-materials (BOM) count and shrinks the PCB footprint by up to 70% for the replaced devices, while enhancing overall system reliability and functional safety (see the figure).

The TLE9744QK can generate the resolver excitation signal internally, eliminating the need for external resolver driver and monitoring circuits. Furthermore, it offers broad power supply compatibility and functional interoperability with a wide range of microcontrollers and gate drivers. This flexibility allows system designers to leverage existing MCU platforms without extensive hardware redesigns, thereby accelerating time-to-market, says the vendor. Support for off-board sensor supply provides additional layout flexibility for optimized system design.

The device further enhances system reliability and safety through an independent hardware architecture. The integrated safety logic (ISL) continuously supervises critical parameters, including phase currents, dc-link voltage, and the health status of the MCU and gate drivers. Acting as a secondary, independent safety path, the ISL determines and enforces a safe state in the event of main MCU dysfunction.

To ensure this protection remains active during power faults, a redundant supply input keeps the ISL operational if the main low-voltage supply fails. This independent design ensures that safety functions are not compromised by a main low-voltage supply failure, fulfilling ASIL-D compliance as developed according to ISO 26262 standards.

The TLE9744QK is available now. Samples, evaluation boards, reference designs, documentation, software, and tools are available upon request. For more information, see the TLE9744QK product [page](#).



(a)



(b)

Figure. The TLE9744QK OPTIREG PMIC consolidates complete power-supply functions, resolver excitation, and a dedicated safety engine into a single device, simplifying traction inverter ECU design and the challenge of supplying multiple isolated power rails for microcontrollers, communication modules, and sensors. A simplified block diagram (a) and package drawings (b) are shown here.