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Silicon Austria Labs and partners develop redundant electrical architecture for next-gen EVs

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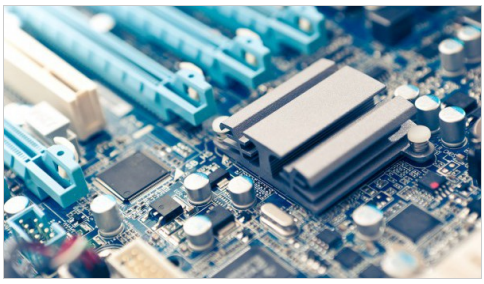
The REDSEL project delivers compact, fail-safe high- and low-voltage systems using advanced semiconductors, replacing mechanical relays with semiconductor switches to boost reliability and efficiency



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An Austrian collaborative project involving Silicon Austria Labs, Infineon Technologies Austria, and AVL List has developed innovative solutions for modern high-voltage and low-voltage vehicle electrical systems, enabling more compact, reliable and fault-tolerant electrical systems for future electric vehicles. After a two-year run, the REDSEL research project was successfully completed, focusing on developing a redundant high-voltage/low-voltage electrical system architecture that enables a flexible and fail-safe power supply in electric vehicles and makes it possible to eliminate the need for the traditional low-voltage battery in electric cars in the long term.

“The technologies we’ve developed lay the groundwork for lighter and more robust vehicle electrical systems, thereby making a significant contribution to the advancement of electric mobility — all the way to future autonomous applications,” said Albert Frank, project leader at Silicon Austria Labs.

At the core of REDSEL is a redundant system architecture with active load balancing between two high-voltage batteries, ensuring even load distribution and significantly increasing operational reliability. This is complemented by the development of a power electronics converter with multiple inputs that, due to an innovative magnetic integration concept, is particularly compact, efficient and space-saving. Technologically, the project used the newest semiconductor solutions: on the high-voltage side, 750V silicon carbide MOSFETs (CoolSiC™) were used, and on the low-voltage side, 30V OptiMOS-7 devices were employed for the first time, offering significant efficiency advantages over previous 40-V solutions, with improved electrical system specifications in modern electric vehicles enabling the safe use of these early development prototypes.

In addition, a new safety architecture for switching and shutdown functions was developed, replacing mechanical relays with semiconductor switches, thereby increasing reliability, reducing required installation space and weight, and enhancing the system's operational safety.

“REDSEL is an excellent example of how new, innovative system solutions can emerge through collaboration between academic and industrial partners. The system demonstrator developed for the project impressively demonstrates how new vehicle electrical architecture can be implemented more safely and scalable in the future,” emphasizes Ernst Katzmaier, project leader at Infineon Technologies Austria.

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