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AVNET®

/ SOLUTIONS FOR EVOLVING EV DESIGNS

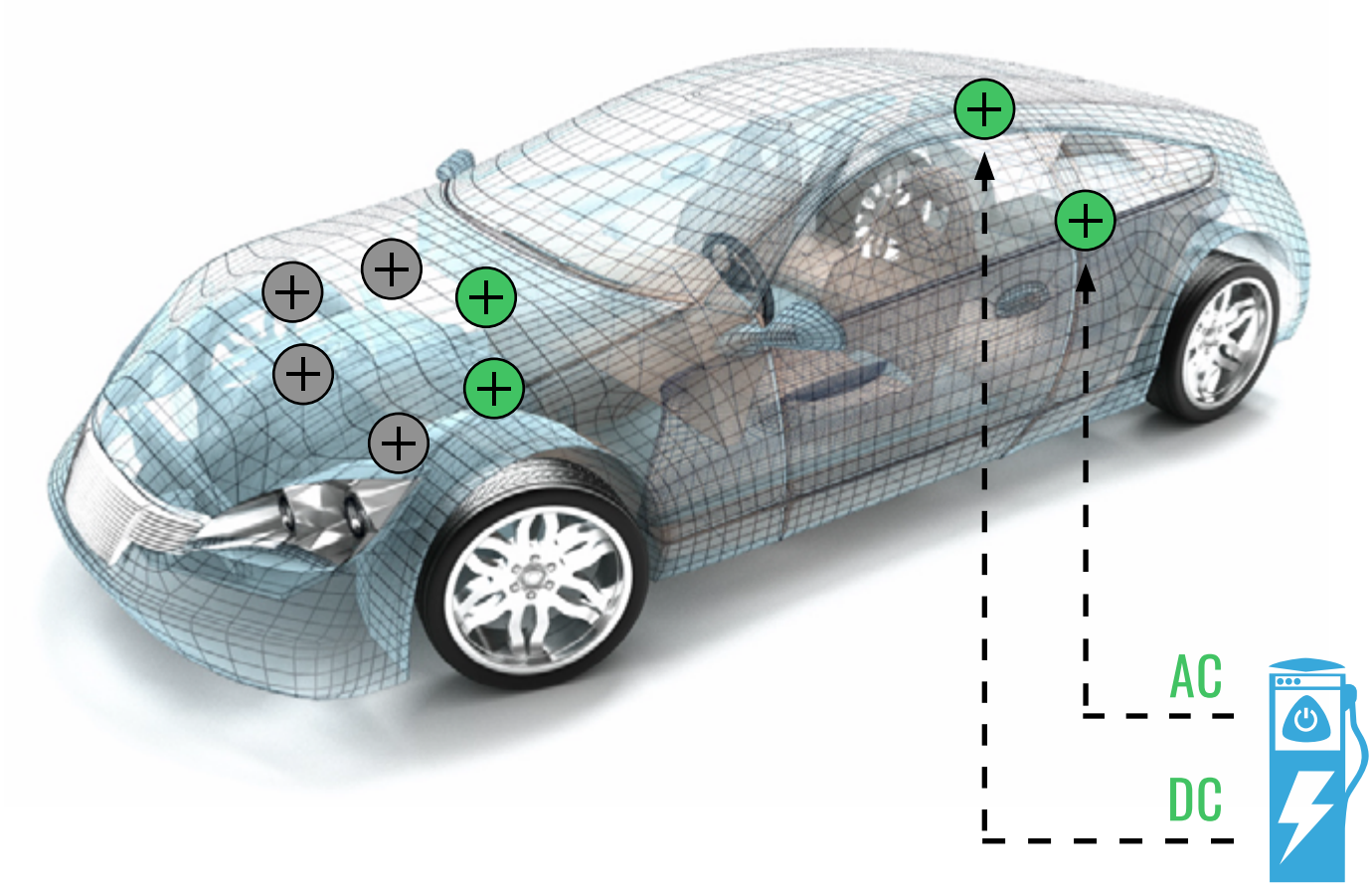
INTRODUCTION

ST provides leading-edge automotive solutions for Electromobility, Hybrid (HEV) and Battery Electric Vehicles (BEV), based upon proven and innovative technologies, and backed up with our extensive power management experience.

Best-in-class IGBT, silicon and SiC (Silicon Carbide) MOSFETs and diodes, protection components, isolated gate drivers and microcontrollers make up an unrivalled offer for electric vehicle power management. They are available as discrete components, or as part of dedicated system solutions, all in accordance with the AEC-Q100 and AEC-Q101 standards.

If you are looking the cost-effective, yet emission reducing first step on the electrification ladder with silicon solutions for 48V systems for mild hybrids, we have the solutions. If you need **traction inverter**, **battery management system** and **on-board charger solutions** for a fully electric vehicle, ST has the products you need too.

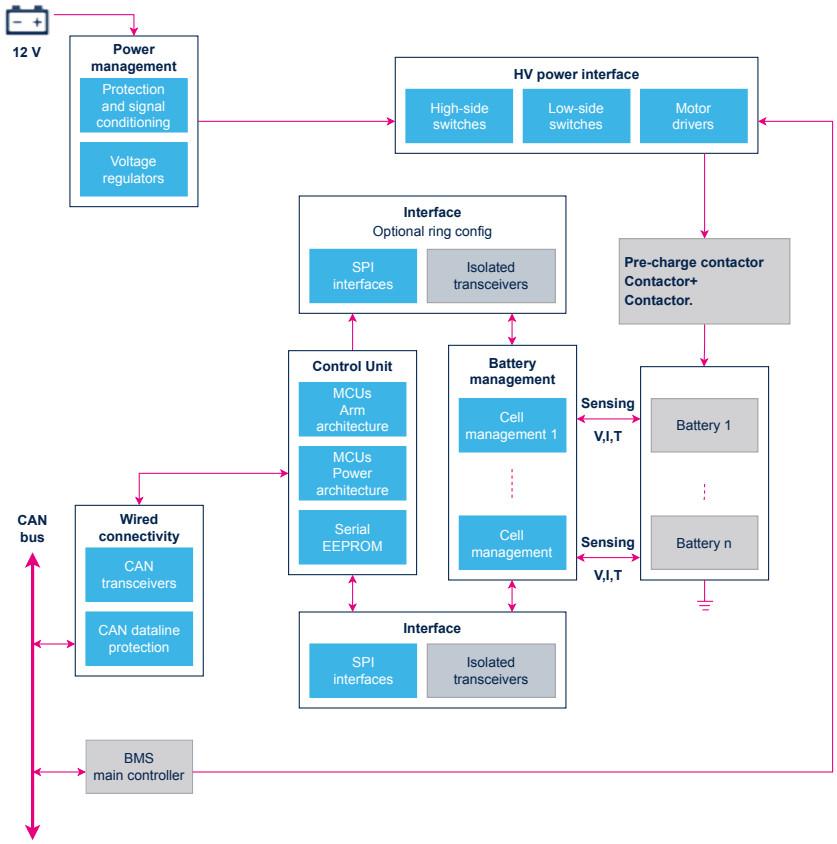
Explore



(°) Not in BEV
(°°) PHEV and BEV only

HV BATTERY PACK

Automotive Battery Management Systems (BMS) must be able to meet critical features such as voltage, temperature and current monitoring, battery state of charge (SoC) and cell balancing of lithium-ion (Li-ion) batteries.



The main functions of a Battery Management System for electric vehicles are:

- Battery protection to prevent operations outside its safe operating area.
- Battery monitoring by estimating the battery pack state of charge (SoC) and state of health (SoH) during charging and discharging.
- Battery optimization thanks to cell balancing that improves the battery life and capacity, thus optimizing the driving range for hybrid (HEV), plug-in (PHEV) and full electric vehicles (BEV).

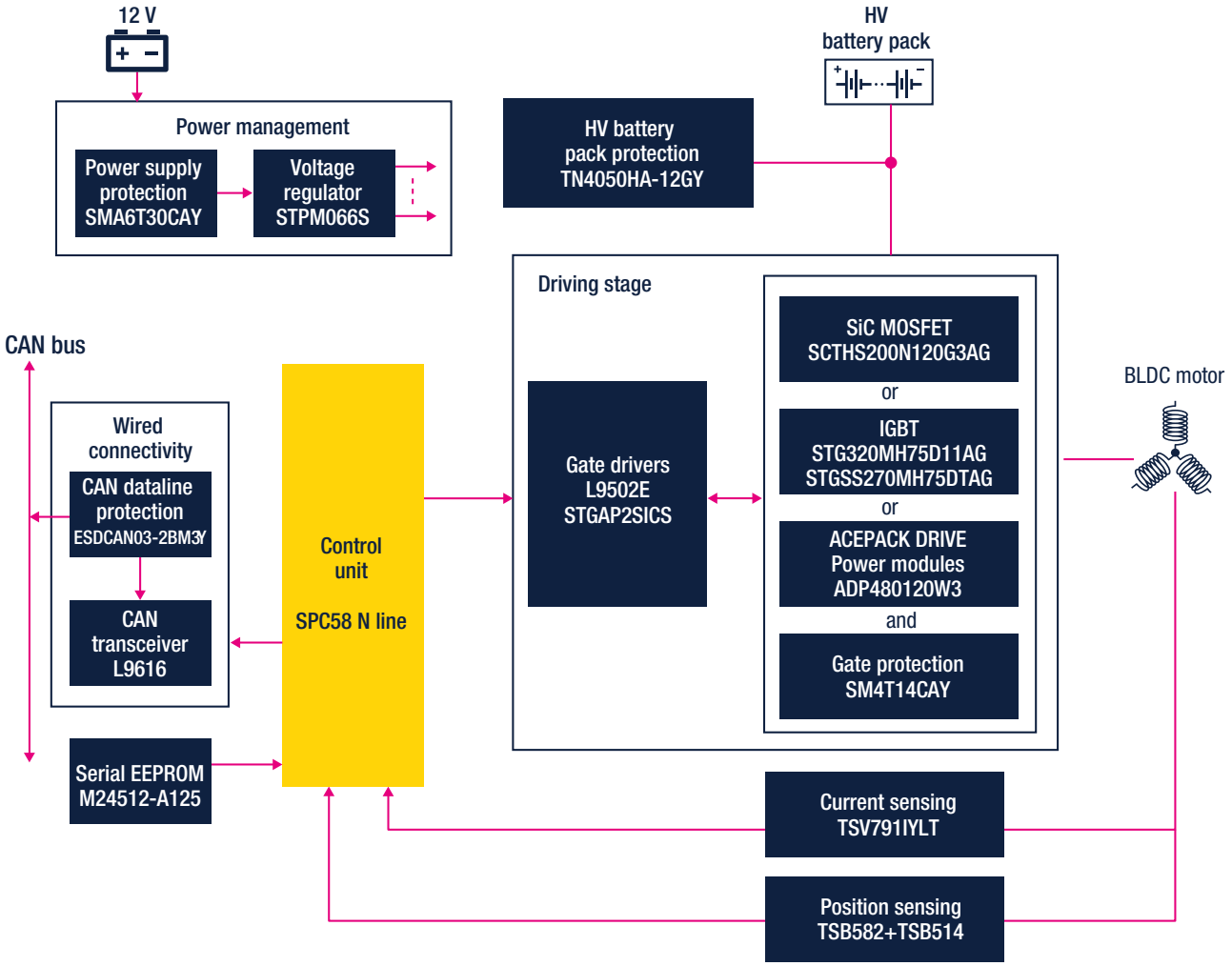
ST's Battery Management System solution for automotive applications is specifically conceived to meet demanding design requirements. Based on the new highly-integrated Battery Management IC **L9963E** and its companion isolated transceiver **L9963T**, ST's solution can provide the highest accuracy measurements of up to 14 cells in series, on mono or bi-directional daisy-chain configuration, embedding sophisticated cell monitoring & diagnostic features. It also meets the stringent Automotive Safety Integrity Level (ASIL) D compliance.

FEATURED EVAL BOARD: L9963E Li-Ion Battery Monitoring and Protecting Chip Evaluation Board

EVAL-L9963E-MCU

TRACTION INVERTER

The traction inverter converts energy from the vehicle's battery in order to drive the motors in the drivetrain. This key component has a direct impact on road performance, driving range and reliability of the vehicle also as a consequence of their weight and size. Subject to all the possible stress found in a road vehicle from heat and vibrations, these converters must be able to handle high power and currents along with the associated Electro Magnetic Compatibility (EMC) challenges as well as provide fail-safe operation to ensure dependability and safety for the driver and passengers.



Automotive Main Inverter Solution based on STMicroelectronics

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VIEW REFERENCE DESIGN

DC-DC CONVERTER

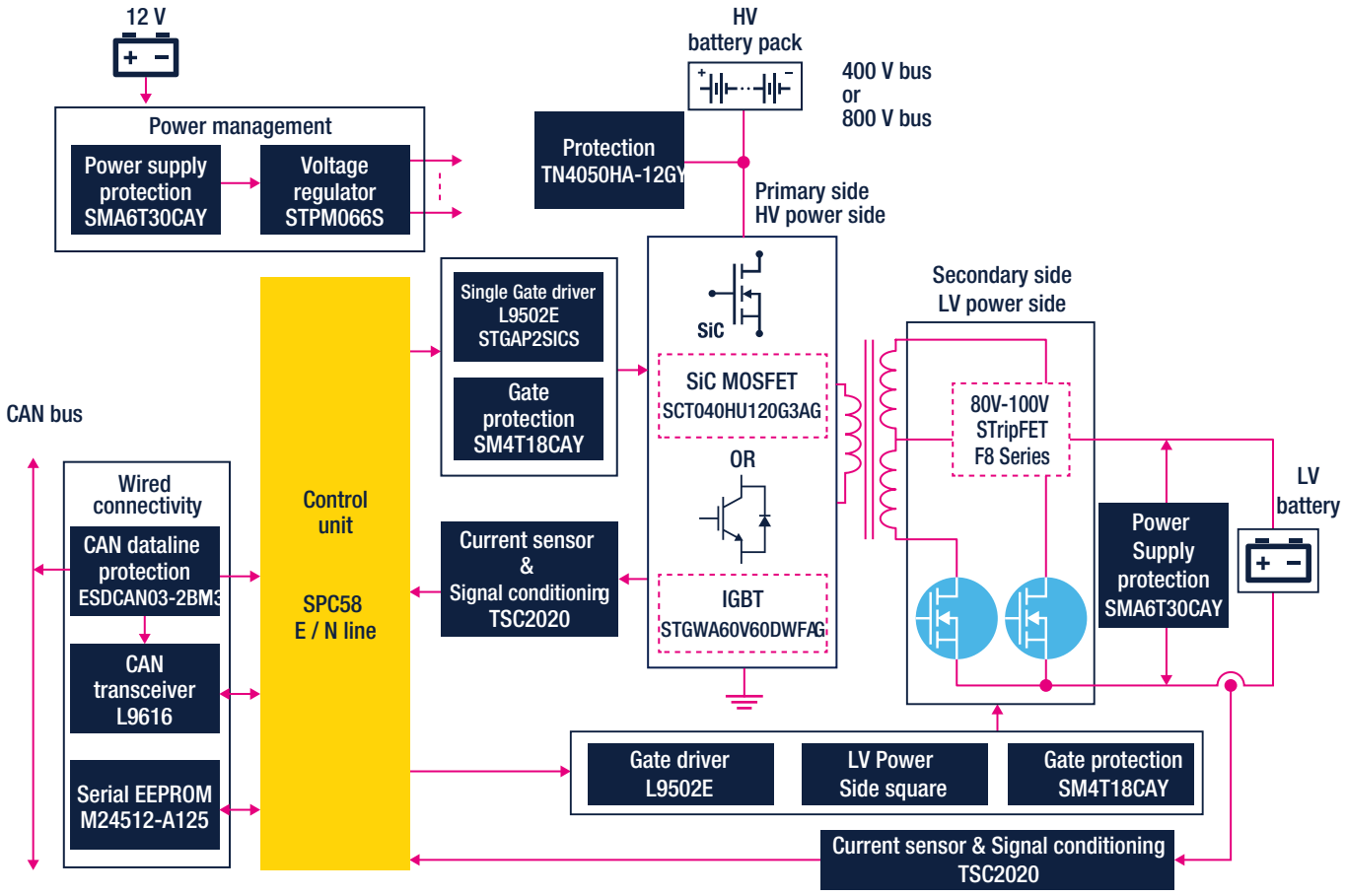
DC-DC converters convert HV to 48V, HV to 12V, and 48V to 12V in the various configurations of electric vehicles. The key design requirements for DC-DC converters are low losses, high efficiency, low volume and light weight. There are many architectures requiring different kinds of semiconductor devices.

48V to 12V bidirectional DC/DC converter >

In mild hybrid electric vehicles, the DC/DC converter is a mandatory part of the overall system. It is typically used in buck mode to supply electrical energy to the 12V system, which has been created by the 48V starter generator. In some cases, such as starting the vehicle and autonomous driving functions, it can also be used in boost mode.

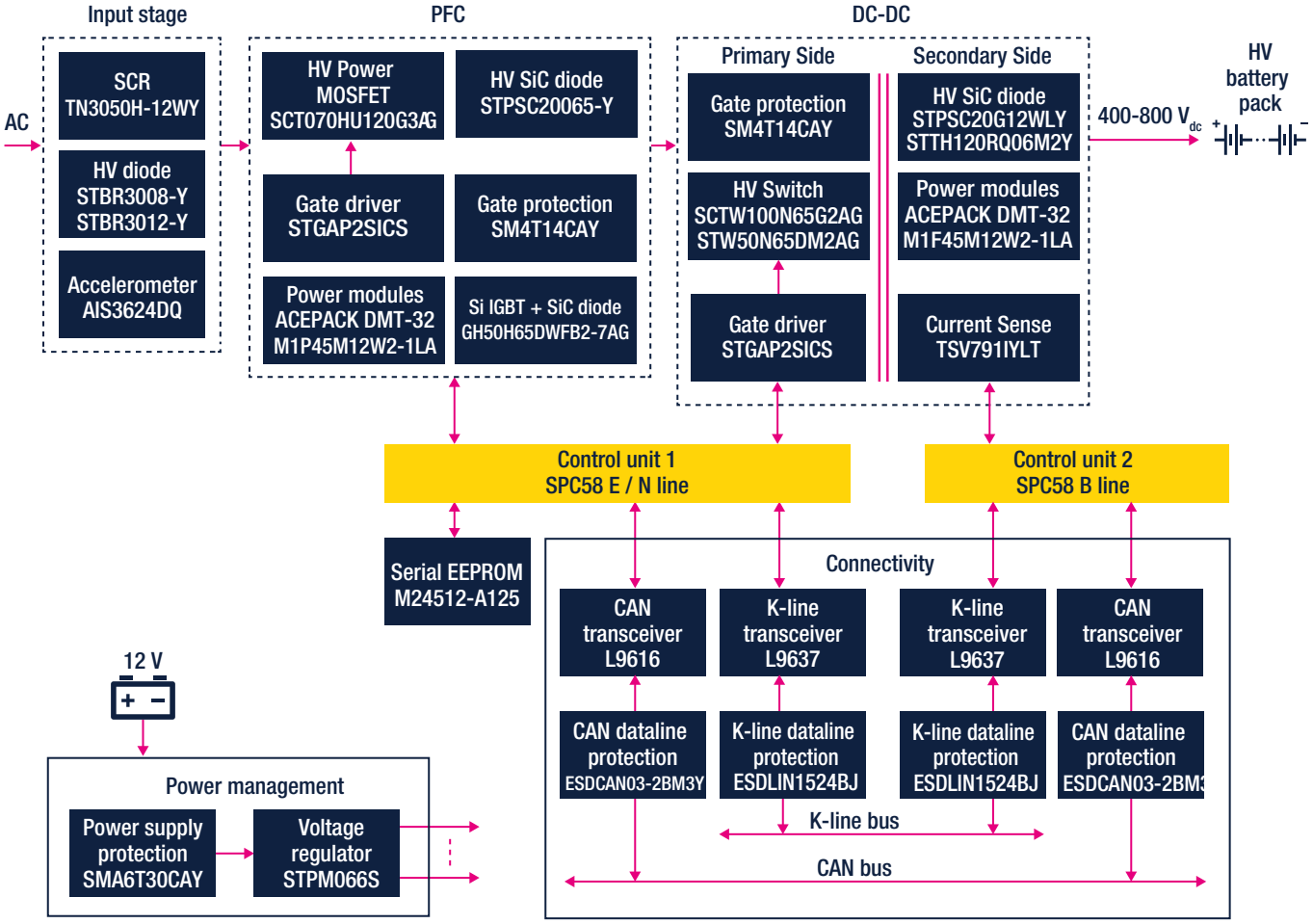
Bidirectional DC/DC converter >

Electric vehicles (EV) use two different power systems; a high-voltage battery (200 to 800 VDC) for traction and a low-voltage (12 V) one for supplying all the electric appliances in the vehicle. Traditionally the low-voltage battery was charged from the alternator, but in today's vehicles it gets its power from the high-voltage battery pack. However, in specific electric car architectures, this low voltage battery should be ready to help recharge the high-voltage battery pack in order to provide energy for cranking the car. This means that the on-board DC-DC converter must be bi-directional and very efficient as well as highly reliable in order to run the complex control algorithms needed to ensure an energy-efficient solution.



ON-BOARD CHARGER (OBC)

At the heart of any electric (EV) or plug-in hybrid (HEV) vehicle lays the high-voltage (200 to 800 VDC) battery and its associated charging system. The on-board charger (OBC) provides the means to recharge the battery from the AC mains either at home or from outlets found in private or public charging stations. From a 3.6 kW single-phase to a 22 kW three-phase high-power converter, today's (OBCs) On-Board Chargers must have the highest possible efficiency and reliability to ensure rapid charging times as well as meet the limited space and weight requirements.



WHAT'S NEXT?

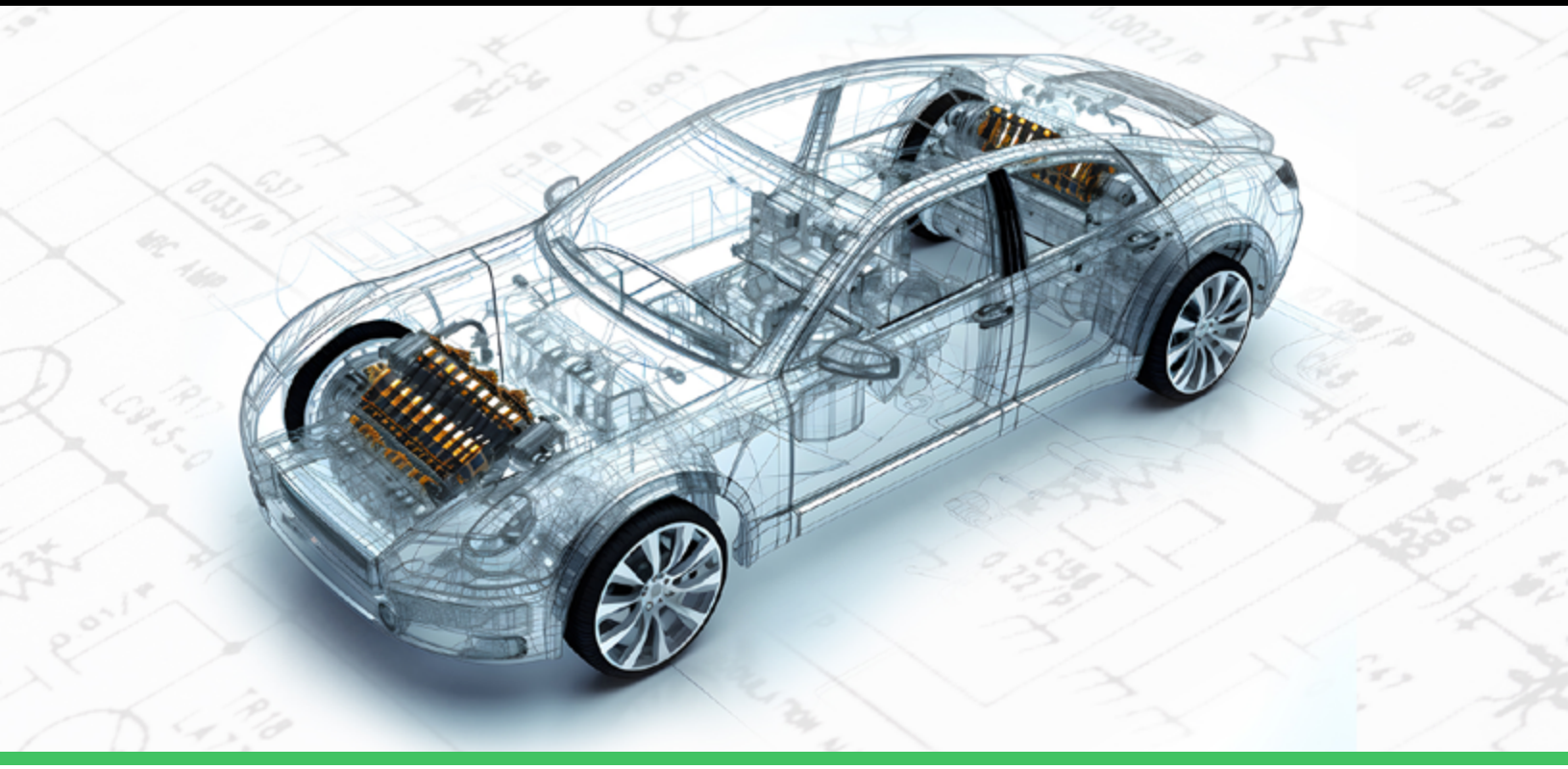
ST AUTODEVKIT DEVELOPMENT INITIATIVE

The AutoDevKit initiative is a fast-growing toolset for Automotive & Transportation Application Development. It allows design engineers to quickly build their prototype combining hardware, firmware and software in an easy way and fully supported by our community.

The ST ecosystem offers a wide selection of Automotive MCU and devices covering several automotive applications:

- Battery management systems (BMS)
- Logistics and delivery robots
- AI on standard MCUs
- Internal and external lighting
- Power distribution
- Audio generation and AVAS
- Motor control: door control, side mirror, tailgate and seat adjustment
- HVAC, ventilation, and air quality
- USB type-C power delivery

Be sure to reach out to your local Avnet Account Manager for more information on this exciting Automotive development toolkit!



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