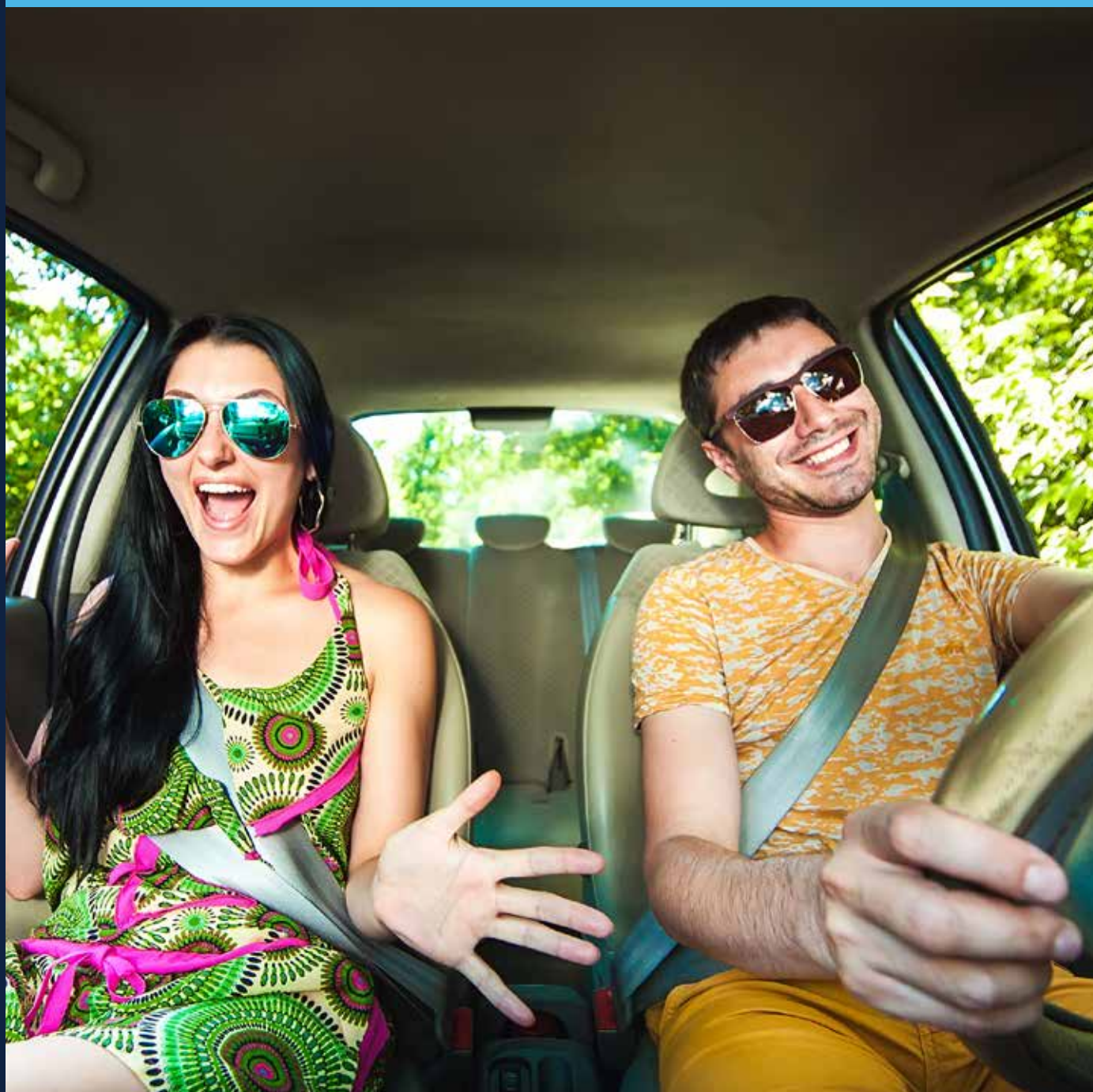




# Automotive Solutions for Body and Convenience



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# Smart Mobility

It is estimated that 80% of all innovations in the automotive industry today are directly or indirectly enabled by electronics. With vehicle functionality improving with every new model this means a continuous increase in the semiconductor content per car.

With over 30 years' experience in automotive electronics, ST is a solid, innovative, and reliable partner with whom to build the future of transportation.

ST's Smart Mobility products and solutions are making driving safer, greener and more connected through the combination of several of our technologies.

**80%**  
of all innovations  
in the automotive  
industry today  
are enabled by  
electronics



## SAFER

Driving is safer thanks to our Advanced Driver Assistance Systems (ADAS) – vision processing, radar, imaging and sensors, as well as our adaptive lighting systems, user display and monitoring technologies.

## GREENER

Driving is greener with our automotive processors for engine management systems, high-efficiency smart power electronics at the heart of all automotive sub-systems and devices for hybrid and electric vehicle applications.

## MORE CONNECTED

Vehicles are more connected using our infotainment and telematics processors and sensors, as well as our radio tuners and amplifiers, positioning technologies, and secure vehicle-to-vehicle (V2V) and vehicle-to infrastructure (V2X) connectivity solutions.

ST supports a wide range of automotive applications, from Powertrain for ICE, Chassis and Safety, Body and Convenience to Telematics and Infotainment, paving the way to the new era of car electrification, advanced driving systems and secure car connectivity.



# Body and Convenience



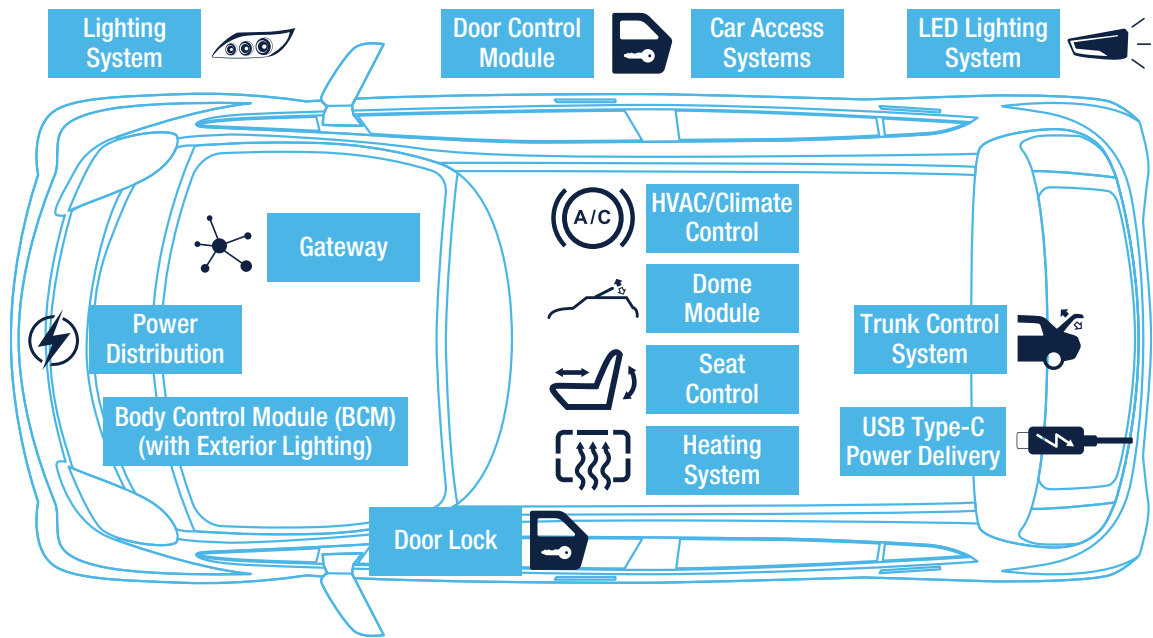
Car body and convenience applications are evolving to increase the comfort of both drivers and passengers. Vehicle manufacturers need solutions that have the flexibility to cover a wide range of car models and a broad range of options. These solutions need to communicate increasing amounts of data to enable decentralized control, enhanced functional safety levels, as well as efficient diagnostic and maintenance capabilities.

Body control modules (BCM) are increasingly being used to control multiple vehicle functions, with integration becoming a key discriminator. Cost-effective flexible semiconductor solutions for BCMs depend upon having the right technology for the application needs.

ST has the broadest product portfolio dedicated to body and convenience solutions, covering interior and exterior lighting systems for bulbs, xenon HID and LEDs and drive controllers for stepper, brushed and brushless DC motors. We provide complete solutions for seat positioning and trunk, mirror, window, wiper and lock control as well as everything required for automatic climate control systems. In addition, we supply connectivity solutions to link all the sub-systems together.

Our proven automotive-grade Smart Power technologies, Bipolar-CMOS-DMOS (BCD) and VIPower can combine multiple functions on a single chip to provide unprecedented levels of integration. Our CMOS and discrete power technologies complement the Smart Power technologies and our wide range of automotive packages completes the offer.

KEY APPLICATIONS



SOLUTIONS

ST’s key products and solutions for body and convenience applications include:

VIPower and BCD Actuators, Motor Control and LED drivers	Sensors	EEPROM	Power Management	EOS & ESD protection, EMI filters	32-bit Automotive Microcontrollers
	NFC	Connectivity	Power Diode, MOSFET & IGBT	Dedicated Door Module ICs	

HW & SW development and evaluation tools



**FIND OUT MORE**  
[www.st.com/body-and-convenience](http://www.st.com/body-and-convenience)

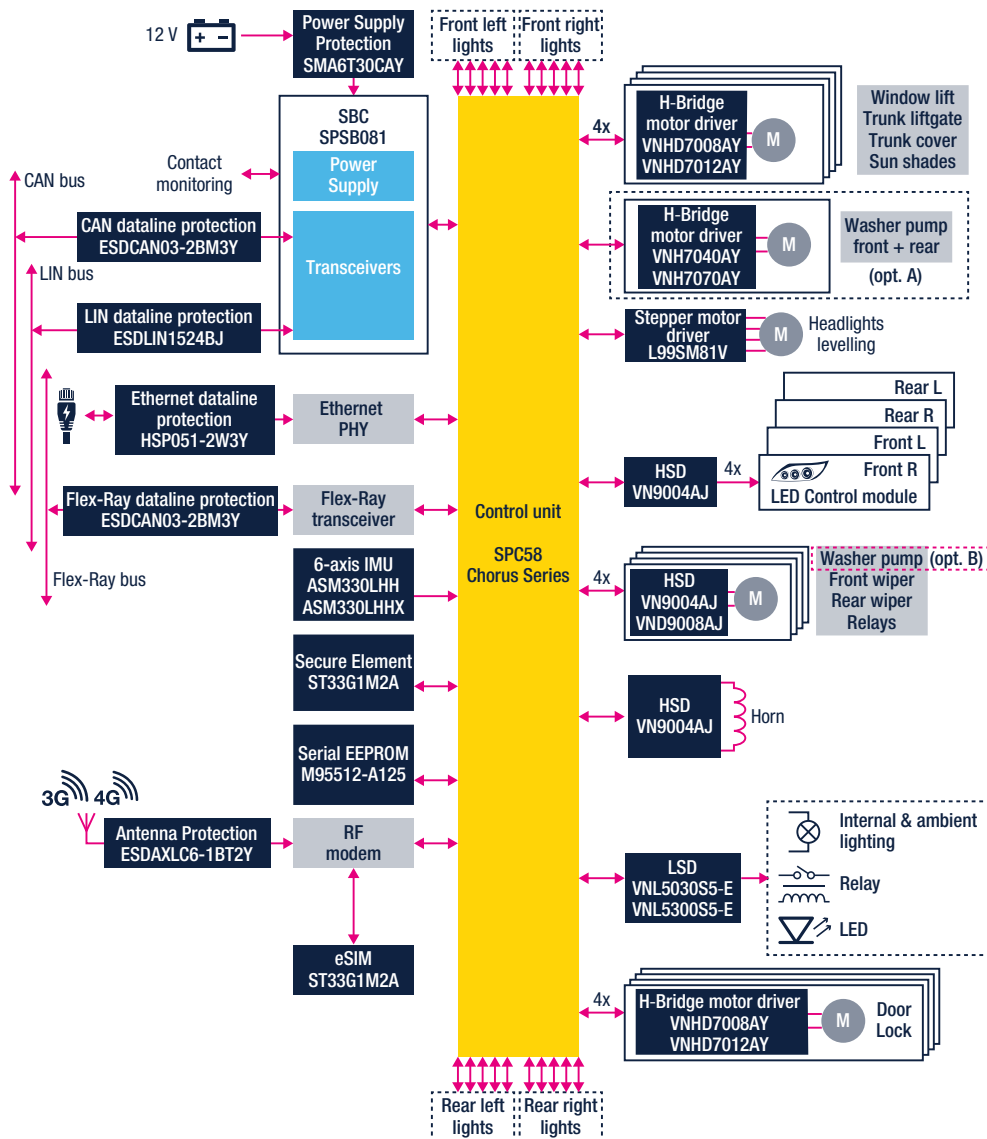
- |                           |                        |                      |
|---------------------------|------------------------|----------------------|
| Body Control Module       | Exterior Lighting      | LED Lighting System  |
| USB Type-C Power Delivery | Automotive Gateway     | Secure Car Access    |
| Dome Module               | Head-up Display (HUD)  | Power Distribution   |
| Door Lock                 | Heating System         | Seat Control Module  |
| Door Control Module       | HVAC / Climate Control | Trunk Control System |

## BODY CONTROL MODULE (BCM)

Body control modules add increased safety, security and convenience functionality to vehicles. These modules monitor and control the functions adding to their overall reliability and efficiency. As automobiles become increasingly complex, and increasingly reliant on networked systems, BCMs are becoming a key factor in vehicle design. Many vehicles now employ multiple BCMs, each dedicated to a specific subsystem, such as:

- Lighting control including incandescent, HID, Xenon, and LED lamps as well as their related diagnostics monitoring (overload and temperature protection, bulb outage detection, etc);
- Motor control drives for mirrors, wipers, windows, seat position, dome, door & safe lock, and washer pumps;
- Security control for immobilizers and NFC keyless entry systems.

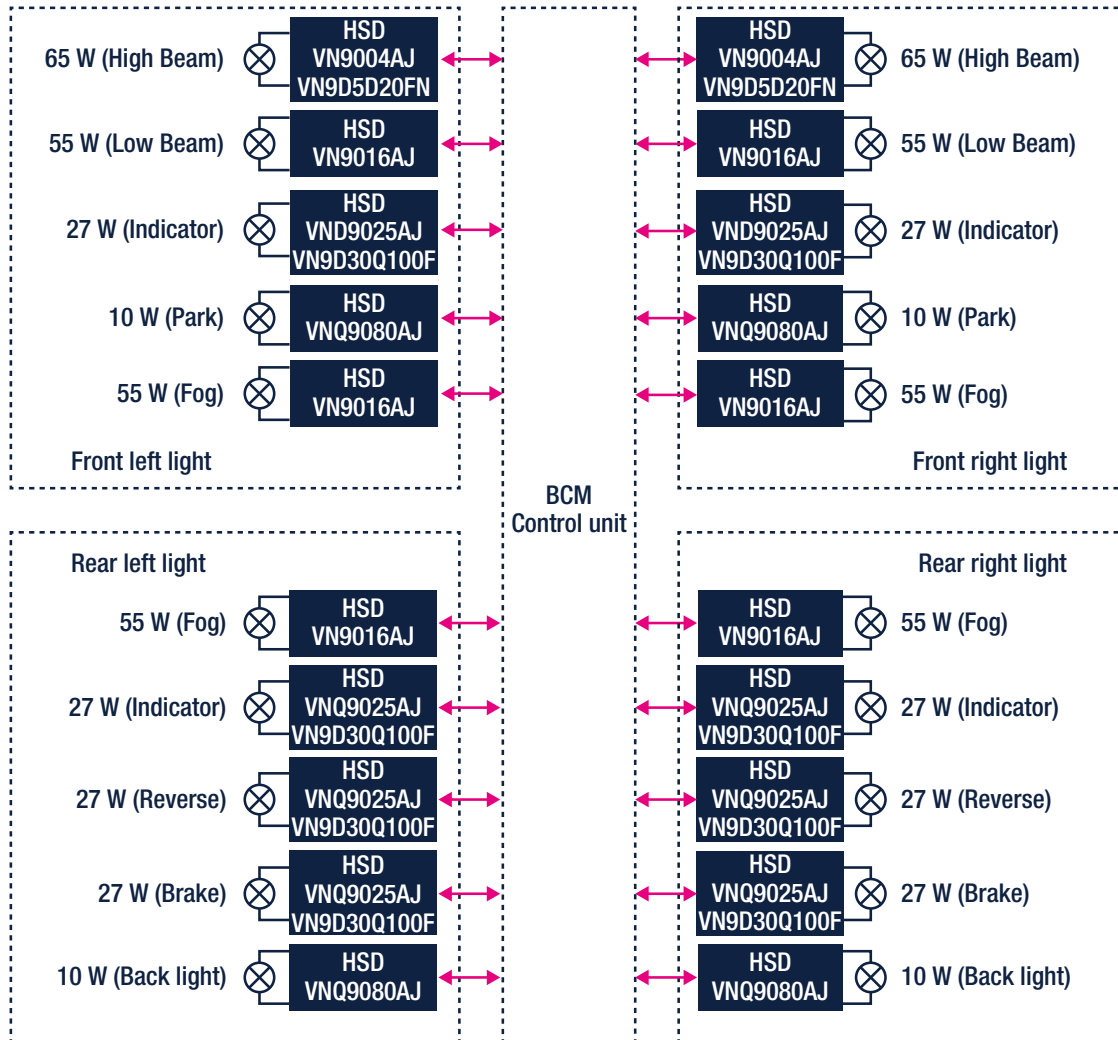
BCMs are at the forefront of the trend to replace the traditional relay-based systems with integrated power devices with embedded diagnostics. Cost-effective flexible semiconductor solutions for BCMs depend upon having the right technology for the application needs.



**FIND OUT MORE**  
[www.st.com/body-control-module](http://www.st.com/body-control-module)

## CAR EXTERIOR LIGHTING

Traditional incandescent lighting systems have not yet totally been replaced by LEDs. The requirements for reliability remain as lighting is key to driver and pedestrian safety. ST supplies solutions for vehicle headlights, taillights and indicators/flashers offering a wide selection of high- and low-side drivers. These can drive a range of wattage requirements from high-power “high beam” lamps, through front or rear lights and down to low-power loads such as indicators and back lights.



**FIND OUT MORE**

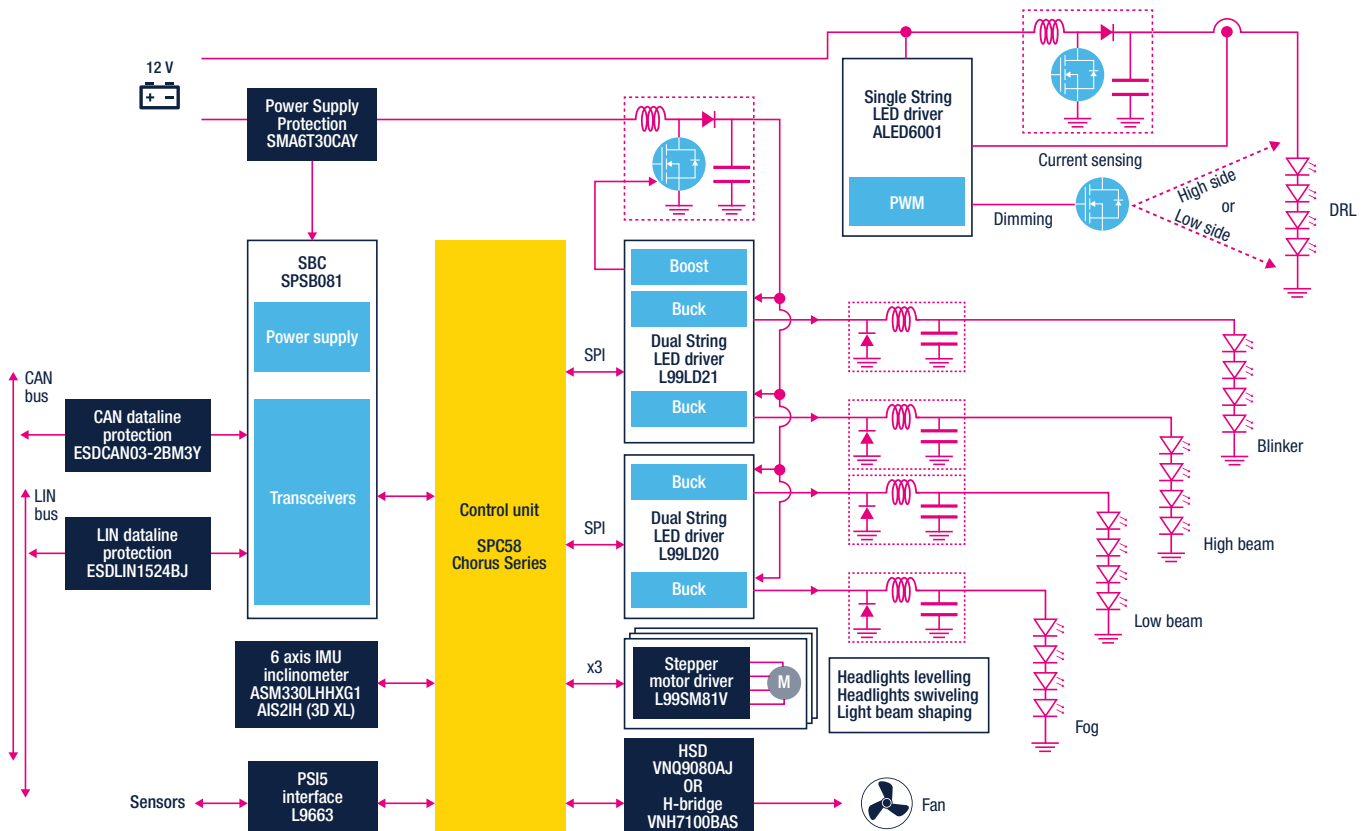
[www.st.com/car-exterior-lighting](http://www.st.com/car-exterior-lighting)

## LED FRONT LIGHT

In all automotive lighting systems, LEDs are replacing existing technologies due to their inherent power efficiency, increased lifetime (with intrinsic shock resistance), design flexibility and continuing cost reduction.

LEDs are transforming the external design of vehicles with new styles and forms of lighting adding to the personality of every new vehicle. Today's smart lighting systems require sophisticated LED drive solutions that include advanced diagnostics (LED string disconnection detection, overload, etc.) and control features (PWM, DC). In addition, more advanced systems implement dynamic lighting and motor drives for headlamp levelling and beam control.

ST has a complete range of solutions for lighting needs, from analog drivers and advanced regulators to dedicated highly flexible drivers for full LED lighting. High-performance, cost-effective automotive microcontrollers and an extensive standard product portfolio complete the offer.

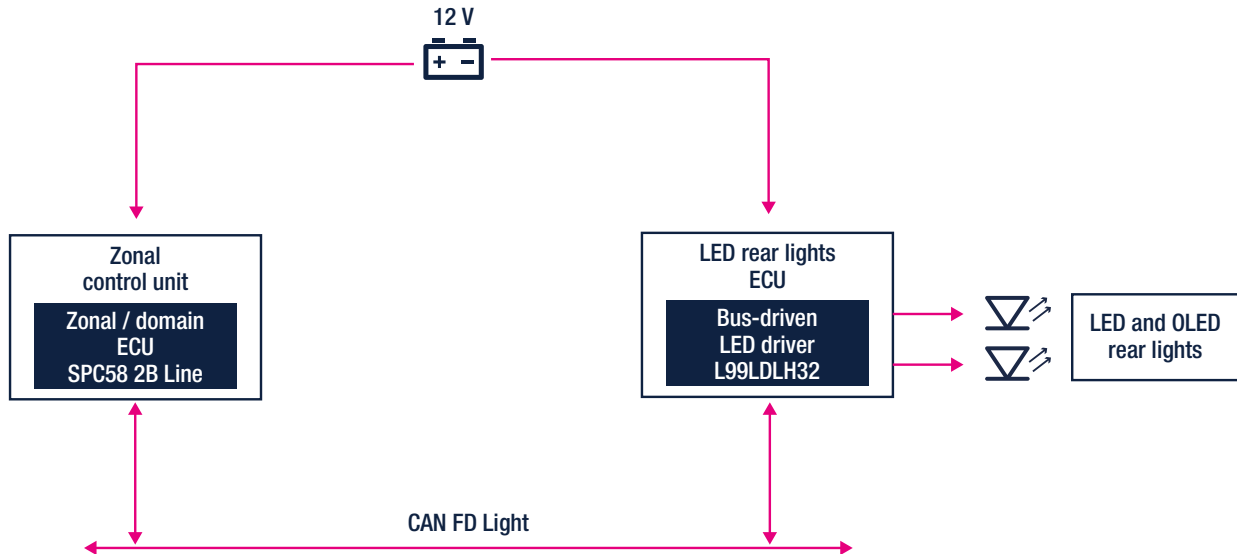


**FIND OUT MORE**  
[www.st.com/led-front-light](http://www.st.com/led-front-light)



## LED REAR LIGHT

We have a complete solution for Active LED rear lighting either for a traditional design approach or for the new Zonal or Domain approach, the latter based on our proprietary “CAN FD light” protocol. It includes high-power LED drivers, power management ICs, transceivers and ESD protection devices. The control unit can be based on one of our large range of SPC5 32-bit automotive microcontrollers, depending on connectivity and memory requirements.



**FIND OUT MORE**

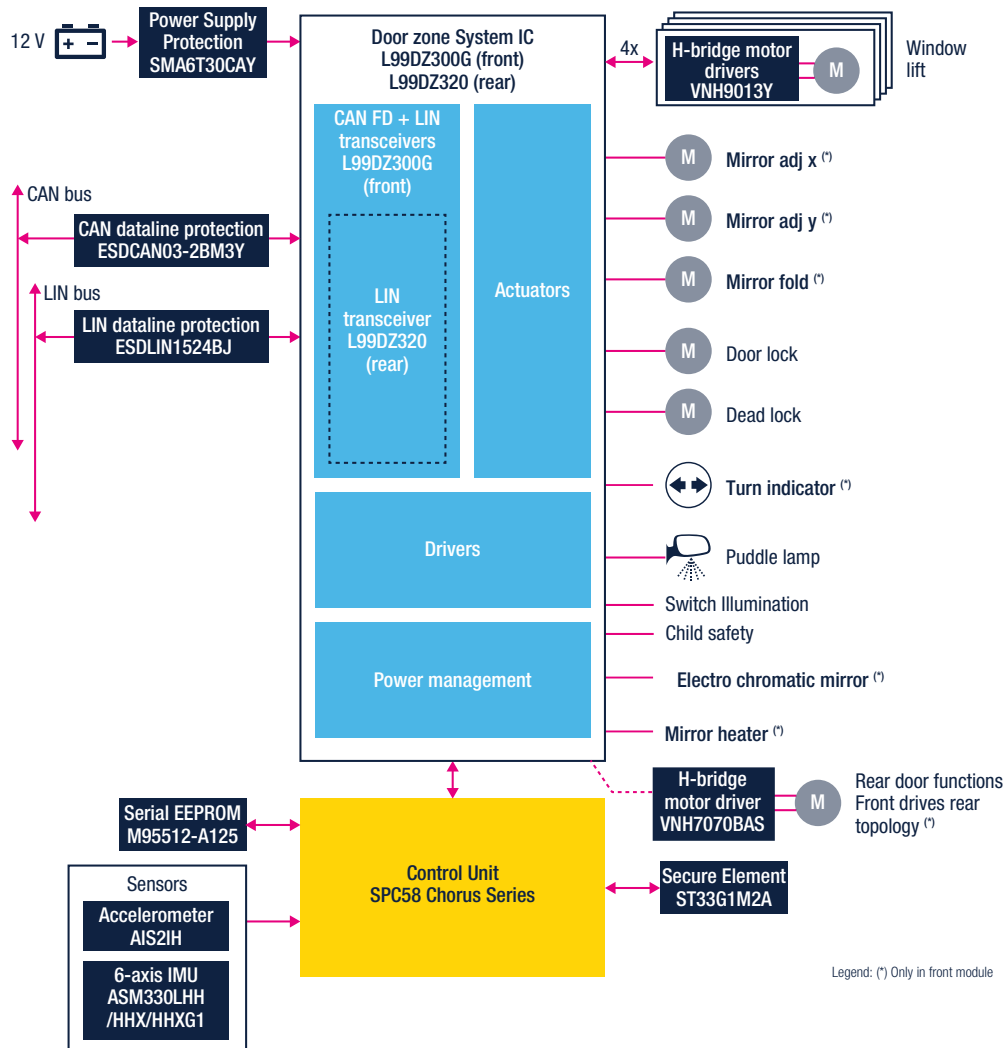
[www.st.com/en/applications/body-and-convenience/led-rear-light.html](http://www.st.com/en/applications/body-and-convenience/led-rear-light.html)

## DOOR CONTROL MODULE

### Decentralized architecture

Door modules, in their simplest form, need to be able to reliably control standard loads such as those presented by door locking motors. In more complex door zone systems, the chipset needs to not only control multiple standard loads such as door lock motors, mirror folders and levellers, but also those for defrosters and several lighting functions from LEDs to incandescent bulbs. Solutions need to be both flexible and scalable, to satisfy the need for different door electronic variants from basic to premium. ST offers “Door Zone System ICs” integrating a power management block, CAN FD and LIN transceivers and drivers/actuators for additional loads, all in one single package. Other solutions are also available, such as an integrated two-chip solution tailored for different door variants, a range of 5V regulators with varying current loads, and high- and low-side drivers in VIPower technology.

ESD and battery protection devices complement the offer to cover all design requirements.



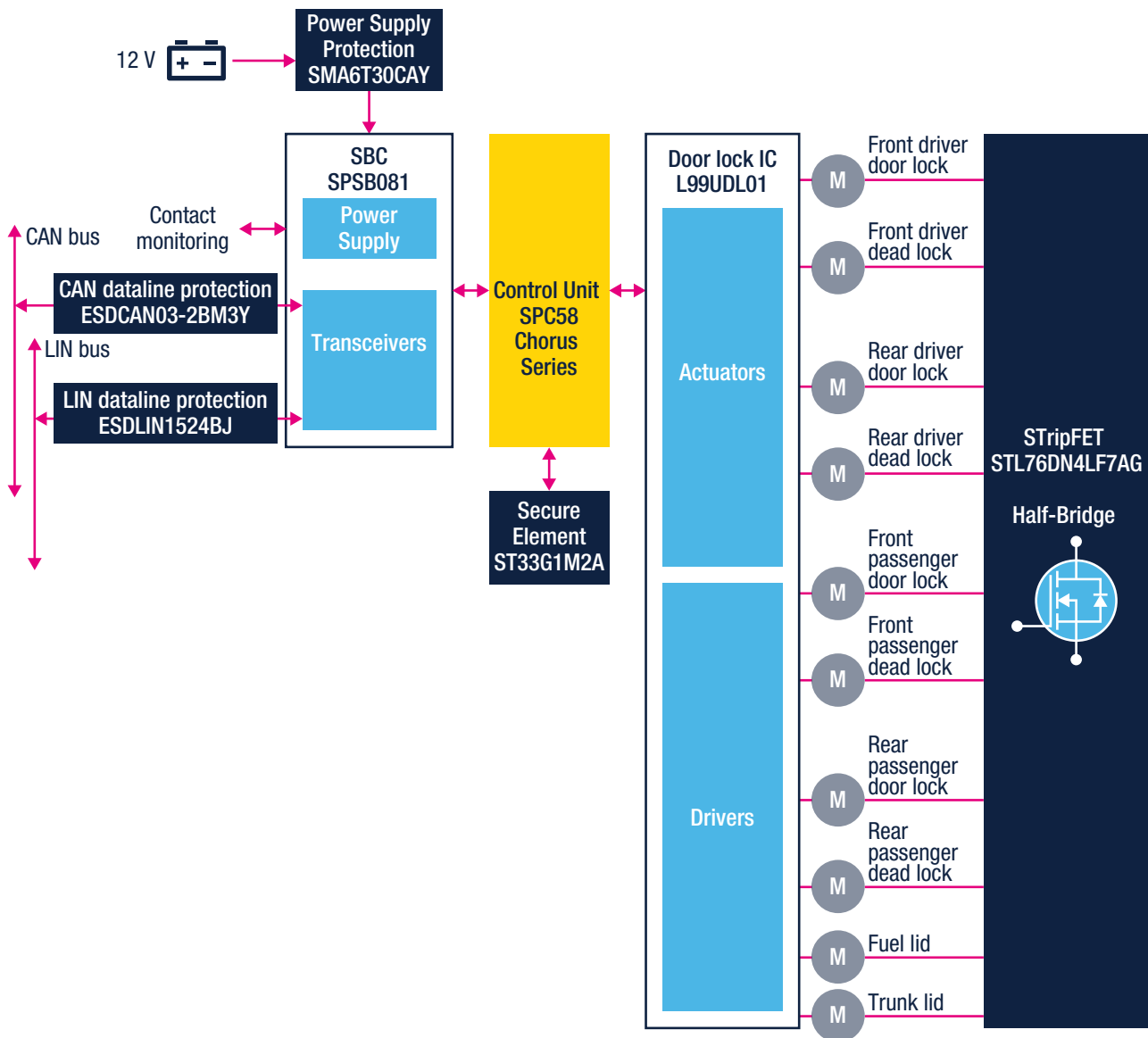
**FIND OUT MORE**  
[www.st.com/door-control-module](http://www.st.com/door-control-module)

## DOOR LOCK

### Centralized architecture

Most vehicles today employ a body control module (BCM) or a dedicated ECU to control door locking and unlocking. Originally employed in luxury cars, electronic control of vehicle access has become almost universal. In addition to controlling the four doors, today's systems have now added trunk and fuel lid locking functions.

ST offers an innovative integrated door lock IC (L99UDL01) that embeds actuation and driving functions, specifically designed to be flexible enough to drive most of the existing car door lock configurations including management of trunks, fuel lids or EV plug lids. Furthermore, the addition of a secure element (MCU) guarantees a high level of security against malicious intrusion attempts.

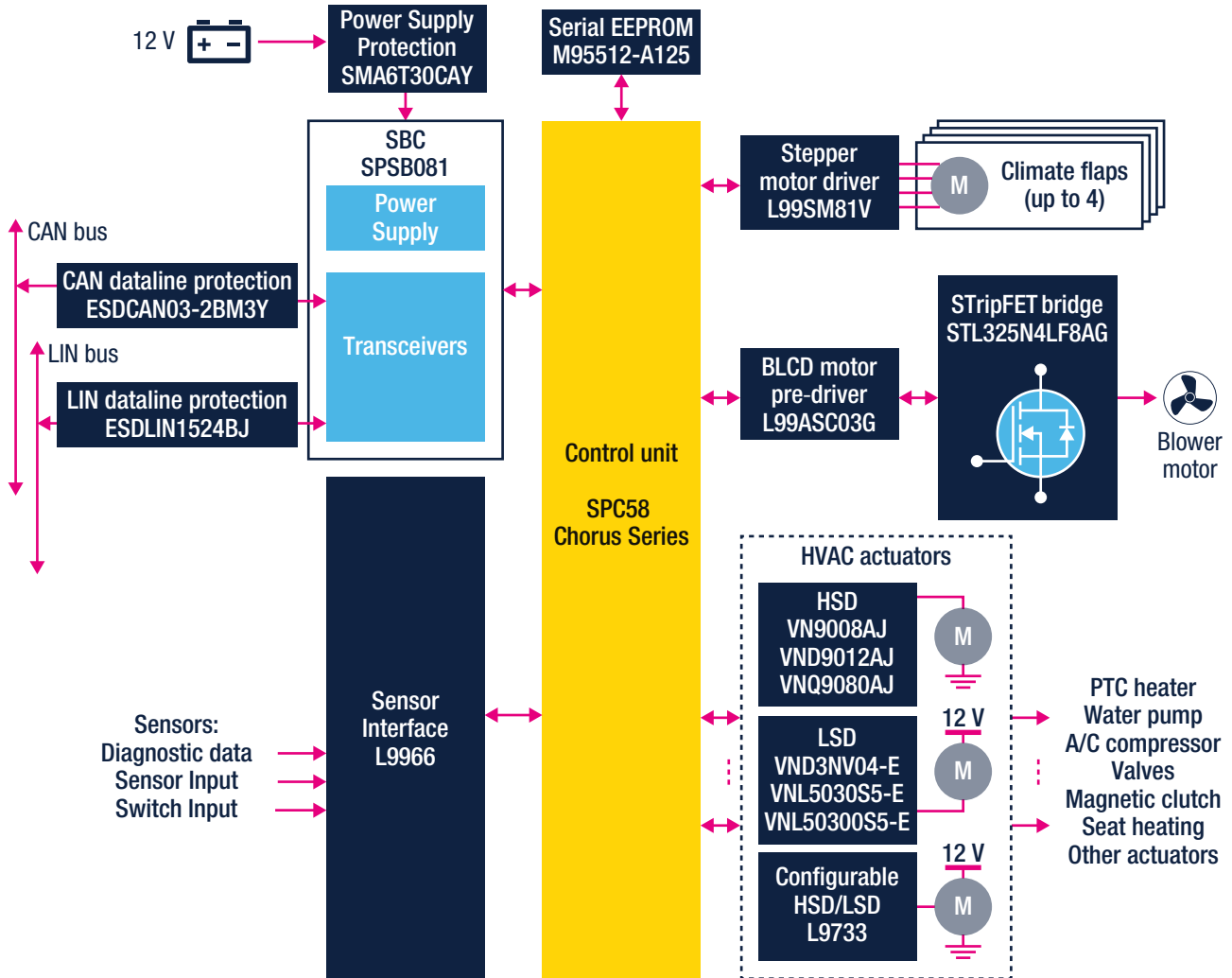


**FIND OUT MORE**

[www.st.com/door-lock](http://www.st.com/door-lock)

## HVAC AND CLIMATE CONTROL

Heating Ventilation and Air Conditioning (HVAC) systems provide an essential level of cabin comfort. ST provides solutions for a wide variety of HVAC implementations: microcontrollers, high- and low-side drivers, stepper motors drivers for flaps and DC / BLDC blower fan motors are all available to enable a reliable cabin climate control system. ST's environmental sensors and interfacing ICs close the feedback loop.



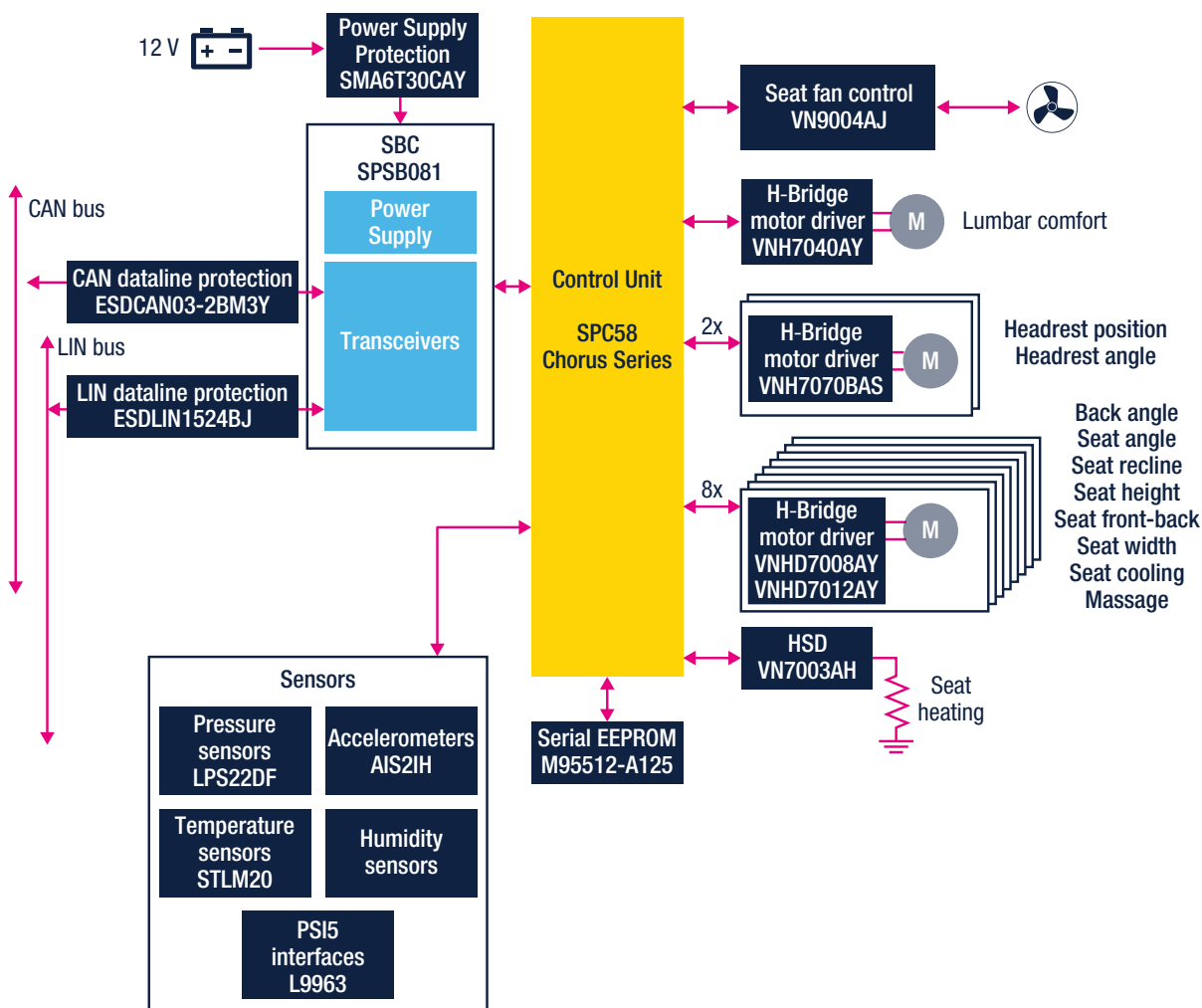
**FIND OUT MORE**

[www.st.com/hvac-and-climate-control](http://www.st.com/hvac-and-climate-control)

## SEAT CONTROL MODULE

Even car seating cannot escape innovation, with car manufacturers bringing fashioned textures, materials and leathers but also new seat features to enhance driving comfort. STMicroelectronics's rich portfolio includes all the necessary components required for innovative automotive seat solutions:

- **High-side switches:** an unrivalled family of high-side switches, the M0-9 HSDs series, based on proprietary VIPower technology
- **Motor drivers:** the latest generation of H-bridges provide a comprehensive, fully integrated and protected solution for low- and medium-power DC motor applications. Together with our motor drivers in BCD technology, our VIPower H-bridges offer an ideal solution to drive seat-positioning motors.
- **Power Management:** In addition to communication transceivers, our System Basis Chip (SBC) devices supply power and drive loads for seat control modules. For more traditional designs, a broad range of automotive-grade linear voltage regulators is also available.
- **Microcontrollers:** SPC5 32-bit MCUs for automotive body applications
- **Connectivity:** Bluetooth, Bluetooth Low Energy and NFC communication modules enable seating adjustment via smartphones.



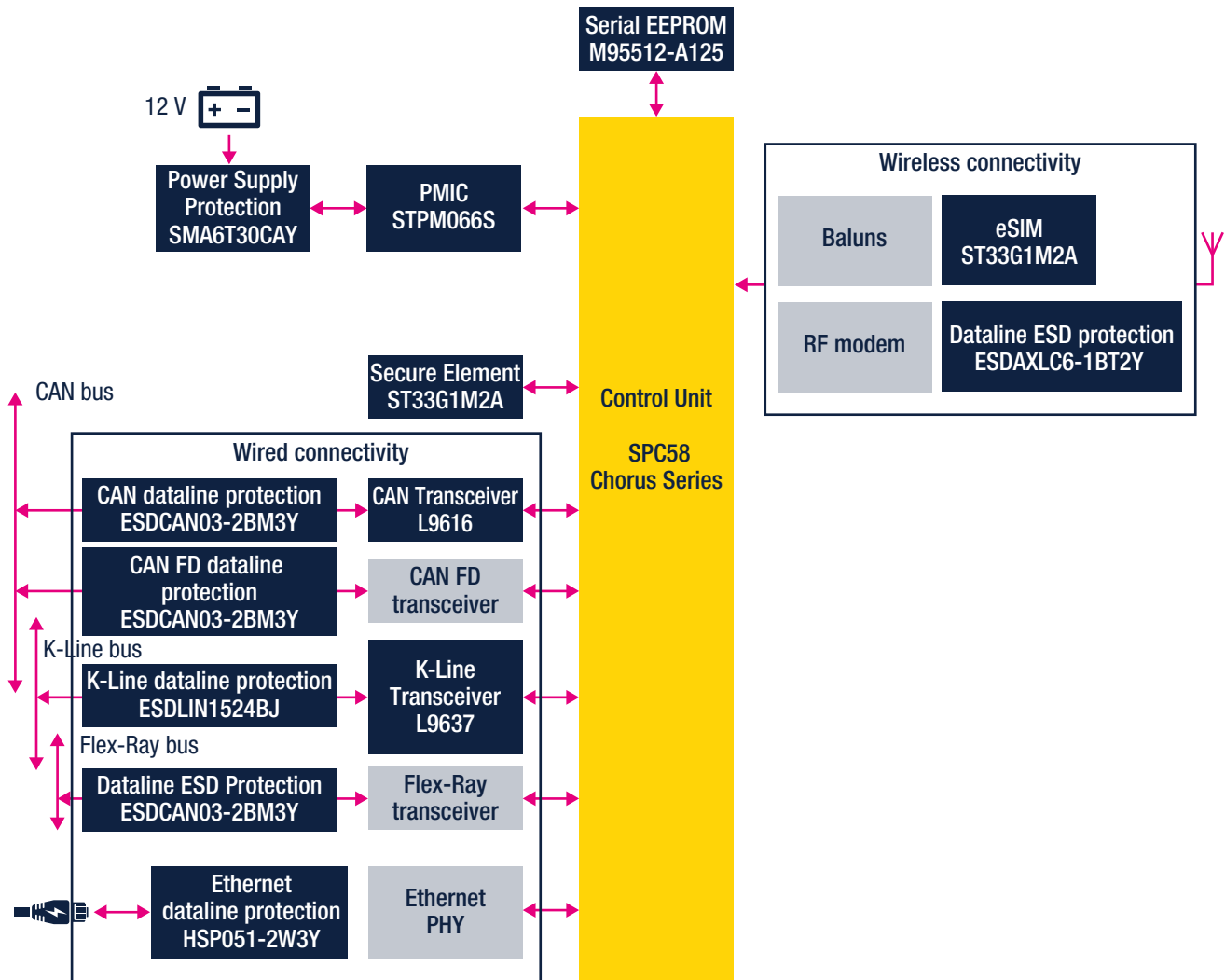
**FIND OUT MORE**  
[www.st.com/seat-control](http://www.st.com/seat-control)



## AUTOMOTIVE GATEWAY

The gateway controller plays a fundamental role as a communication bridge between the various networks inside the vehicle and those external to the vehicle, managing the communication interface. Vehicle architectures implement different protocols to allow communication between the various module typologies operating in a vehicle, including CAN (low- and high-speed), LIN, ISO-9141, Flex-Ray, and Ethernet. Security is a key element in vehicle networking and the gateway has a major role in ensuring that the communication networks are not compromised.

The combination of powerful automotive-grade microcontrollers with built-in hardware security modules and secure elements provide a comprehensive gateway security solution.

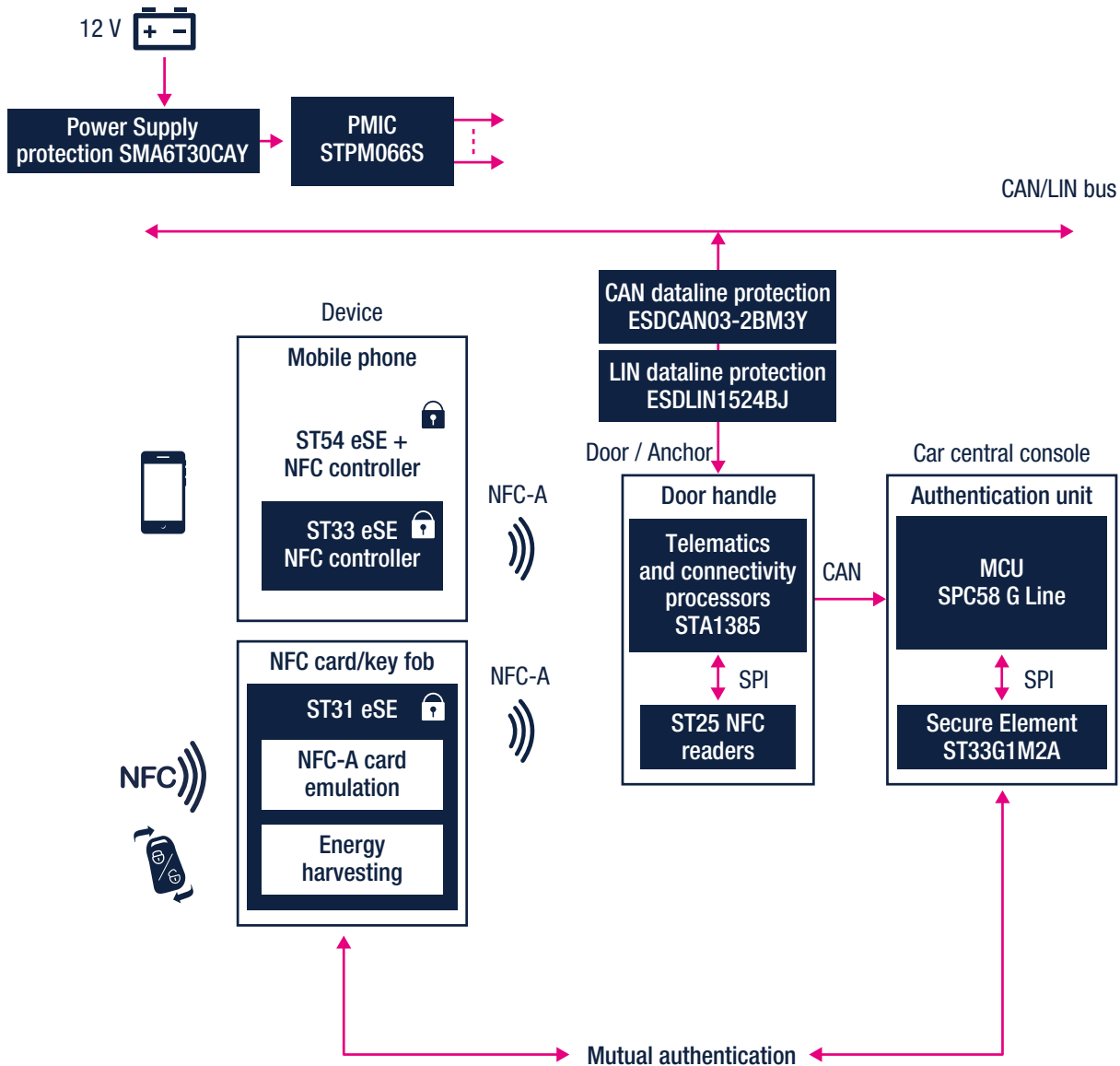


**FIND OUT MORE**  
[www.st.com/automotive-gateway](http://www.st.com/automotive-gateway)

## SECURE CAR ACCESS

Near Field Communication (NFC) -enabled cards or smartphones provide a convenient and secure way to access vehicles. Car keys have long been a weak link in vehicle security and will progressively be replaced by this technology as it filters down from premium vehicles to the mainstream. The NFC-based solutions will not only add a more flexible and cost-effective access mechanism, they will also provide new possibilities such as enabling rental car companies to send to a renter's smartphone the ability to unlock and start their rental car using NFC.

ST's NFC transceivers and SPC58 microcontrollers with embedded Hardware Security Modules (HSM), cover the most important requirements for such access control applications: security, reliability, usability and cost efficiency.



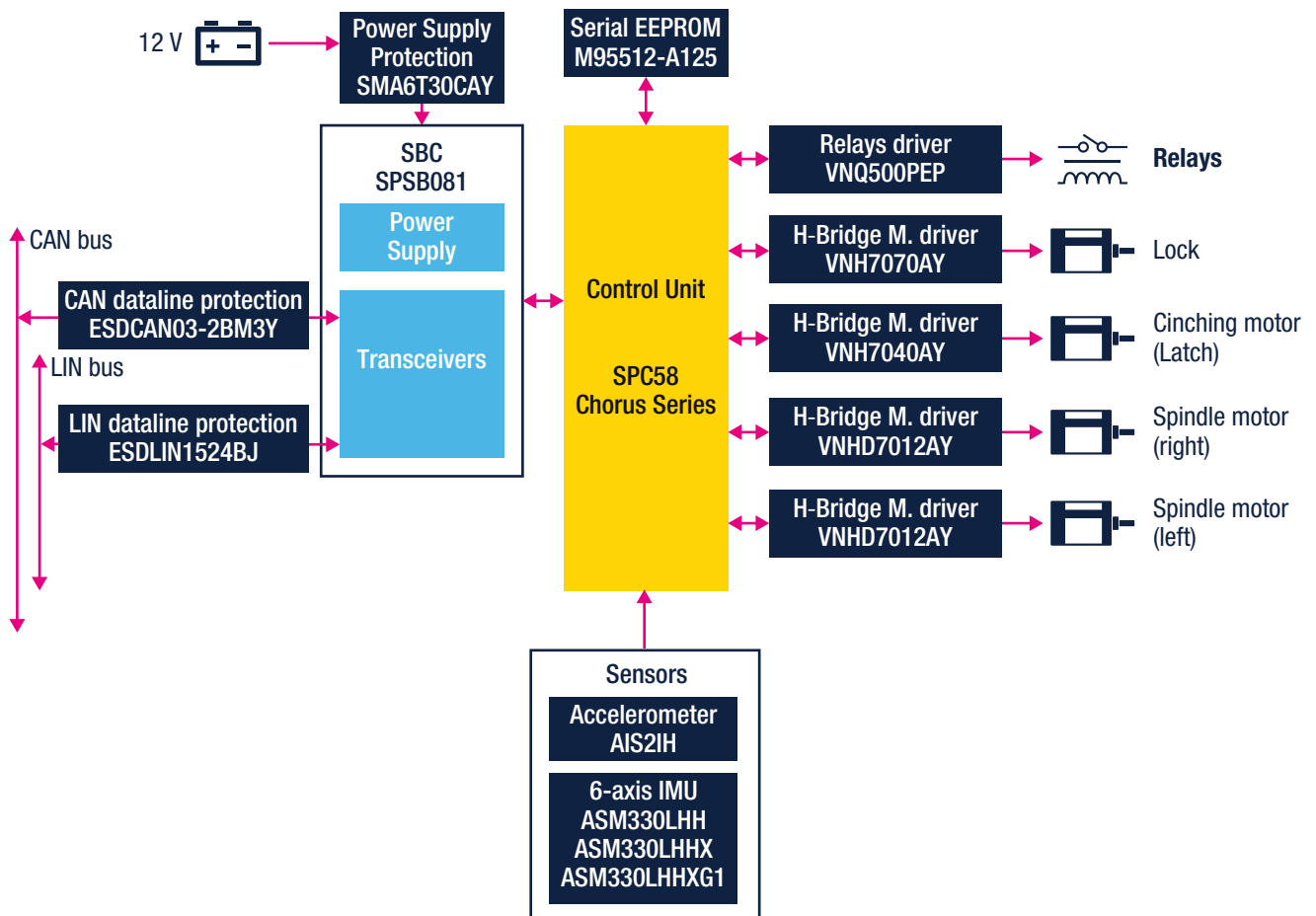
**FIND OUT MORE**  
[www.st.com/nfc-keyless-entry](http://www.st.com/nfc-keyless-entry)

## TRUNK CONTROL SYSTEM

ST has a wide range of automotive products that provide complete trunk control solutions with a range of functions. Electronic locking systems require either electric or hydraulic actuators to engage and disengage the latch. Cinch motor drivers and latch mechanisms enable soft-opening and closing of doors and also add failsafe security mechanisms. ST's VIPower H-Bridge drivers are ideal for controlling the actuators and locking mechanisms, as they are available in many power ranges and have the networked capability, manageable by a dedicated microcontroller.

ST's development ecosystem allows rapid prototyping combining versatile automotive MCUs, for example with our SPC56 B line, with a complete range of VIPower motor driver solutions for car body applications including trunk control systems.

Our flexible, low-cost Easyboard concept lets you evaluate products without committing to the expenses, time and resources typically necessary to design a customized circuit board. These boards (from 8 to 100 mΩ) wire-in a VIPower product to a load for a straightforward evaluation of the device and application functions including the autoprotection capability under hazardous conditions.



**FIND OUT MORE**

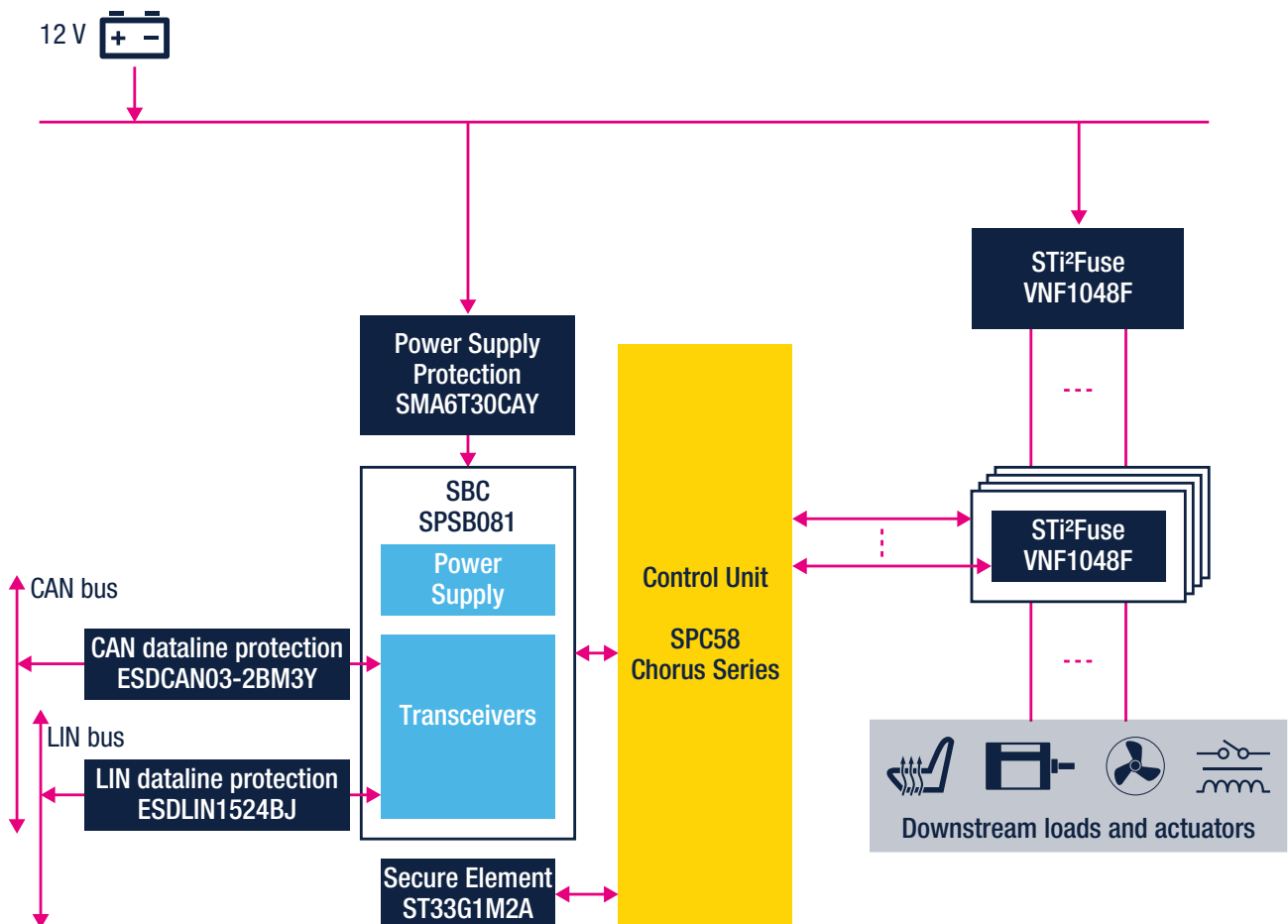
[www.st.com/trunk-control-system](http://www.st.com/trunk-control-system)

## POWER DISTRIBUTION

The electrification and digitalization of vehicles means that power distribution can no longer rely on a block containing a collection of fuses, relays and circuit-breakers with a multitude of wires. The need for increased efficiency, diagnostics and smarter power distribution has led to the development of Intelligent Power Switches based on our proprietary VIPower technology.

Combined with an automotive grade 32-bit SPC58 MCU, these devices not only provide power and protection for sensitive components such as audio systems they also provide valuable diagnostic and maintenance information, combined with a level of security that protects the power distribution from unwanted interference.

Our new STi<sup>2</sup>Fuse family of smart switches for wire harness protection integrates I<sup>2</sup>-t protection and a digital interface to boost efficiency and reliability in the latest automotive zonal electronic/electrical (E/E) architectures. In addition to being a safer and more fault-tolerant method for implementing functional safety protection in autonomous vehicles, STi<sup>2</sup>Fuse also facilitates a proactive approach to improving vehicle health diagnostics and is ideal for predictive maintenance monitoring.



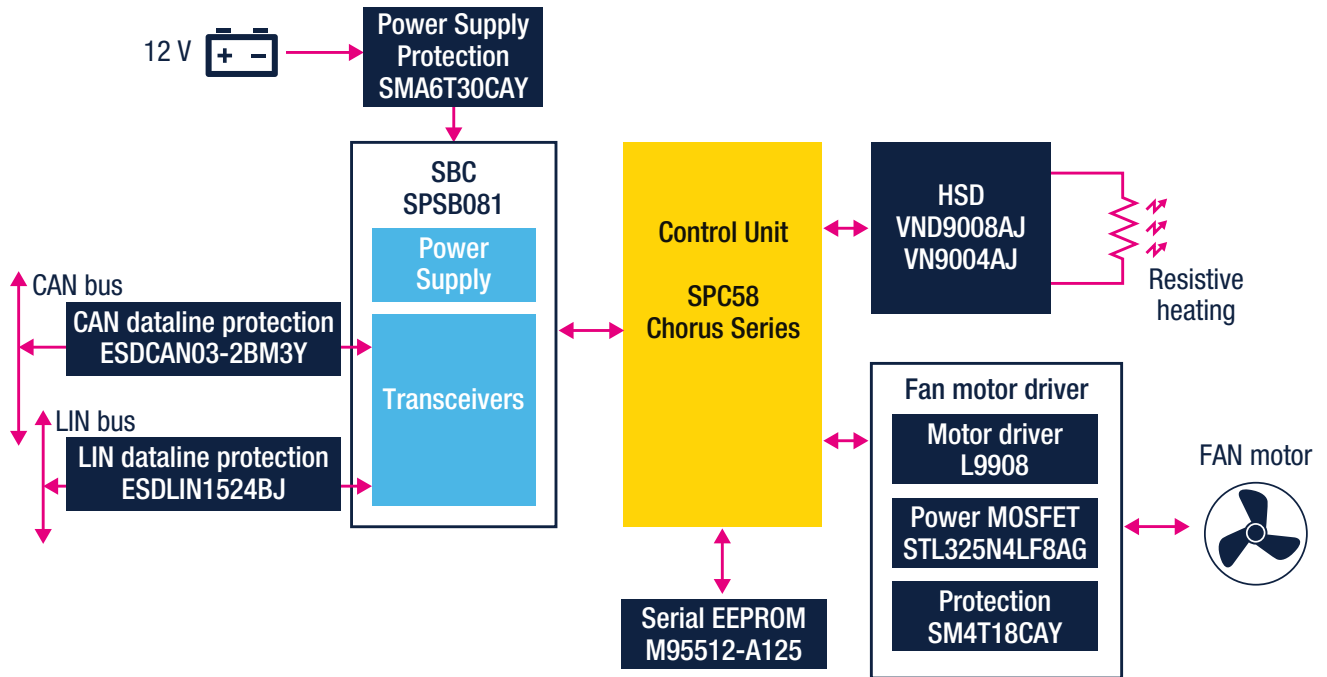
**FIND OUT MORE**  
[www.st.com/power-distribution](http://www.st.com/power-distribution)

## HEATING SYSTEM

Heating systems become increasingly complex when you consider all the possible options – seat and cabin heaters, windshield defrost, heated/cooled compartments and glow plug heaters.

Vehicle manufacturers need a scalable set of solutions to fit the different models in their range, optimized for enhancing comfort for both driver and passengers with accurate and energy-efficient temperature control systems.

We offer a set of application-specific power ICs and 32-bit SPC5 automotive microcontrollers as well as protection devices to enable the development of scalable car heating systems.



**FIND OUT MORE**  
[www.st.com/heating-system](http://www.st.com/heating-system)

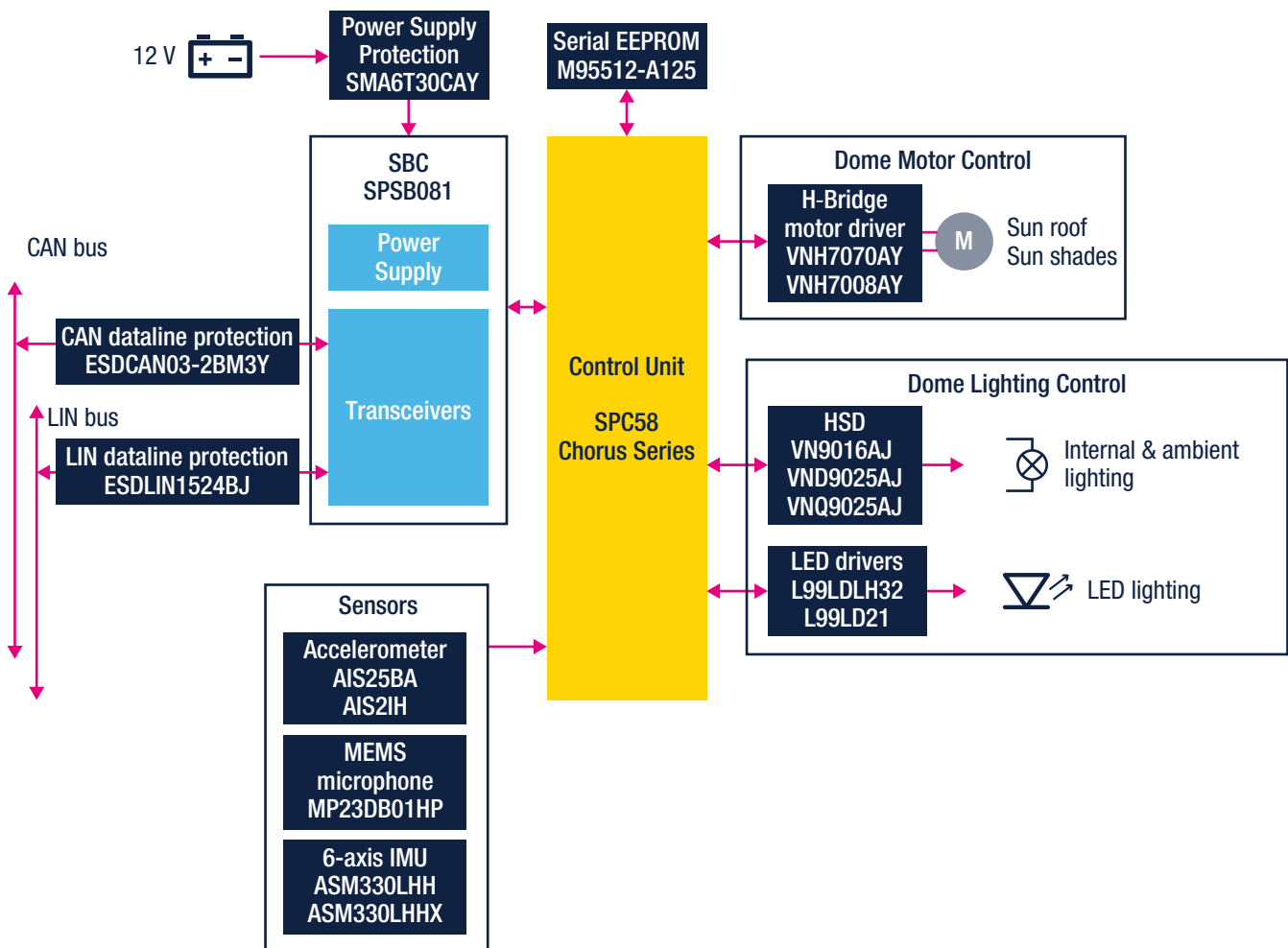


## DOME MODULE

Dome modules of varying complexity are present in most vehicles; placed in the ceiling of the cockpit they provide lighting and controls that are easily accessible by the driver and passengers. Typical features include:

- Ceiling lighting control for LED light sources
- Sunroof control and security
- Microphones for voice control and hands-free operation
- Ambient light level sensors
- SOS buttons for emergency calls and emergency lighting

ST offers a wide range of MEMS sensors and microphones, leading-edge high- and low-side drivers and motor control functions with fully integrated H-bridges. Protection and networking are also covered with our dataline ESD protection and transceiver ICs.



**FIND OUT MORE**  
[www.st.com/dome](http://www.st.com/dome)

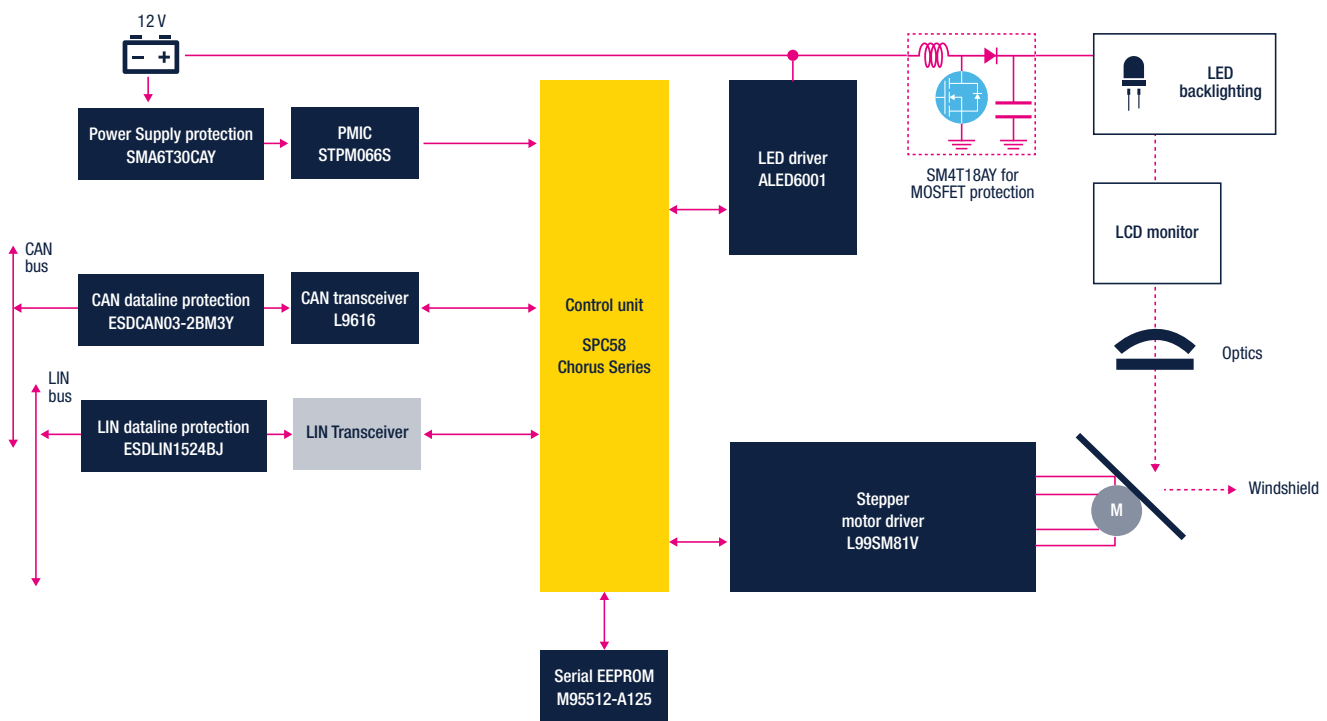
## HEAD-UP DISPLAY (HUD)

The Head-up Display (HUD) reduces dangerous distractions by displaying key information, such as the car's speed, navigation directions and other alerts, directly in the driver's line of sight. First adopted for military purposes on fighter jets, HUD is now playing a crucial role inside the automotive HMI (Human Machine Interface).

A HUD shows the information in the driver's field of view, there is no need to look down at the instrument cluster or the secondary display, and therefore taking their eyes off the road. In the case of a windshield head-up display, drivers are able to see a virtual image as "floating" over the hood at a distance of about 1.5 to 2 meters.

ST enables your HUD designs with its programmable stepper motor driver, for image adjustment, monitored by a 32-bit control unit, providing a versatile and cost-effective solution.

Designed to drive one bipolar stepper motor in micro-stepping mode together with coil voltage measurement for stall detection, our L99SM81V comes with its evaluation boards and a user-friendly software GUI that lets developers set control parameters and monitor real-time information including voltage measurements, main power supply voltage, fault flags, device junction temperature, and more.



**FIND OUT MORE**  
[www.st.com/hud](http://www.st.com/hud)

USB Power Delivery is the next frontier for in-car charging of phones, tablets and mobile PCs: a common cabling for data and power delivery is instrumental to improve re-use and reduce electronic waste; furthermore its cable reversibility significantly enhances the user-experience. The USB Power Delivery protocol enables the connection of different devices with different power profiles: the power negotiation protocol determines the voltage and current profile that the provider supplies to the device.



**FIND OUT MORE**  
**[www.st.com/auto-usb-c](http://www.st.com/auto-usb-c)**

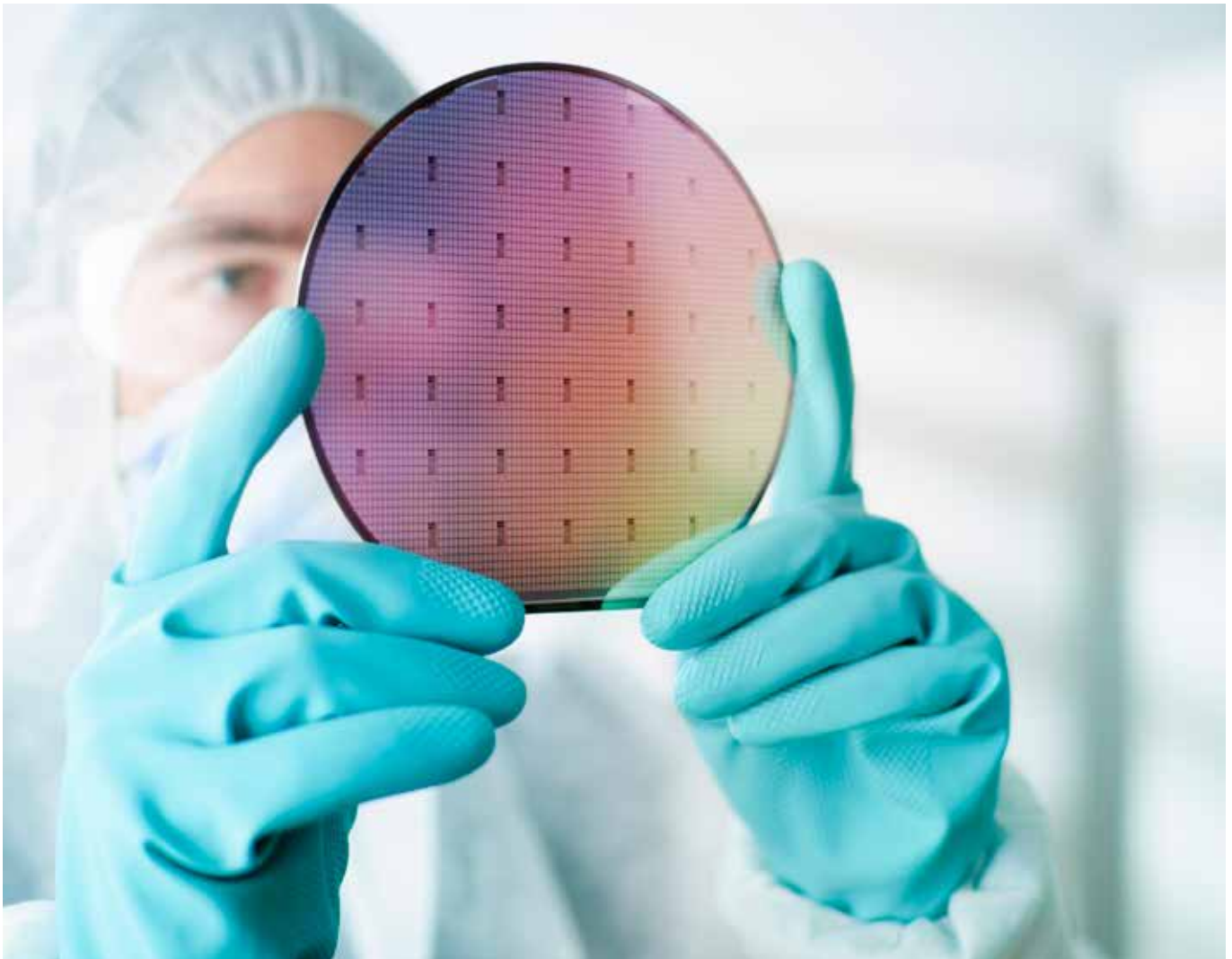
# Key Technologies

## RESEARCH & DEVELOPMENT AND MANUFACTURING

To keep its technology edge, ST maintains a strong commitment to innovation, with approximately 9,000 people working in R&D and product design and spending about 12% of its revenue in R&D. Among the industry's global technology leaders, ST owns and continuously refreshes a substantial patent library with over 19,500 active and pending patents. The company also uses its over 200 R&D partnerships to further foster its innovation.

ST draws on a rich pool of chip-manufacturing technologies, including advanced FD-SOI (Fully Depleted Silicon-on-Insulator) CMOS (Complementary Metal Oxide Semiconductor), differentiated Imaging technologies, RF-SOI (RF Silicon-On-Insulator), BiCMOS, BCD (Bipolar, CMOS, DMOS), Si MOSFET, SiC MOSFET, Si IGBT, VIPower, Transil, Trench Schottky Diodes, and MEMS technologies.

ST believes in the benefits of owning manufacturing facilities and operating them in close proximity to its R&D operations. ST has a worldwide network of front-end (wafer fabrication) and back-end (assembly and test and packaging) plants. ST's principal wafer fabs are located in Agrate Brianza and Catania (Italy), Crolles, Rousset, and Tours (France), and in Singapore. These are complemented by assembly-and-test facilities located in China, Malaysia, Malta, Morocco, the Philippines, and Singapore.



## KEY TECHNOLOGIES FOR AUTOMOTIVE PRODUCTS

### CMOS (Complementary Metal Oxide Semiconductor)

CMOS (Complementary Metal Oxide Semiconductor) is a pure digital technology invented in the 60's. It is largely used in digital products for processing purposes. Starting from CMOS, other technologies have been set up including BCD (Bipolar-CMOS-DMOS) used for mixed signal products, FD-SOI that allows to reduce silicon geometries below 28nm, and embedded NVM at the heart of MCUs. The robustness and versatility of this technology, present in billions of devices, makes it very suitable for all automotive applications.

### FD-SOI / RF-SOI

Fully Depleted Silicon-on-Insulator, or FD-SOI, is a planar process technology that delivers the benefits of reduced silicon geometries while actually simplifying the manufacturing process. The buried oxide layer, specific to FD-SOI MOS, lowers the parasitic capacitances and efficiently confines the electrons flowing from the source to the drain, dramatically reducing performance degrading for leakage currents. This is a key advantage for pure digital products, especially when required to operate at high temperature, allowing very innovative power management techniques. The advanced ADAS platforms are based on this technology and produced in Crolles 300 facility on a 28nm node. Moreover, thanks to the tight electrostatic control of the transistor, FD-SOI is recognized as a leading technology for low-power, RF and millimeter-wave applications.

Associated with the high-density PCM embedded non-volatile memory, ST offers a unique platform for automotive applications.

Key applications include ADAS, RF switches and tuners, low-noise amplifiers, power amplifiers, monolithic integrated RF and FEMs (switches, LNAs, PAs and passives).

**FD-SOI**

### NON-VOLATILE MEMORIES (eNVM)

ST has a strong background in non-volatile memories (NVM) and has developed embedded NVM technologies to enable real-time MCUs and other products that benefit from real-time access to NVM. Today, automotive volumes are at 90 nm and 40 nm technology nodes, and the new Stellar MCU family uses phase-change memory (PCM) to exploit the features of CMOS FD-SOI technology. This evolution to PCM places ST at the forefront of automotive MCUs.

ST standalone non-volatile memories (NVM) are also highly regarded in the industry, especially our automotive serial EEPROM, which is ideal for high-quality and flexible parameter storage, with a wide portfolio ranging from 1 Kbit to 4 Mbits. The automotive Serial EEPROM is robust, high-performance, and designed for intensive operation at high temperatures, making it suitable for all high-reliability applications. The EEPROM is AEC-Q100 qualified, screened through a specific high-reliability testing flow, and PPAP Level 3 compliant. The EEPROM is manufactured in 150 nm technology nodes and is progressively extending to 110 nm. The I<sup>2</sup>C, SPI, and Microwire buses are supported for three packages: SO8N, TSSOP8, and DFN8 up to 150°C



**EEPROM**

### BCD (BIPOLAR-CMOS-DMOS)

BCD (BIPOLAR-CMOS-DMOS) is a key technology for power ICs. BCD combines the strengths of three different process technologies onto a single chip: Bipolar for precise analog functions, CMOS (Complementary Metal Oxide Semiconductor) for digital design and DMOS (Double Diffused Metal Oxide Semiconductor) for power and high-voltage elements.

This combination of technologies brings many advantages: improved reliability, reduced electromagnetic interference and smaller chip area.

BCD has been widely adopted and continuously improved to address a broad range of products and applications in the fields of power management, analog data acquisition and power actuators.



## VIPOWER

Vertical Intelligent Power (VIPOWER) is a technology developed by ST and in production since 1991. VIPOWER technology provides control, protection and diagnostics for medium/high power automotive loads. The technology combines Vertical Double Diffused MOS Power devices with their own temperature and current sensors and CMOS and HV components for power, analog, and mixed-signal designs.

VIPOWER technology plays a key role in the move towards electric vehicles. The smart 48 V networks used in mild- and full-hybrid cars require intelligent power switches to drive high- and low-sided loads and electric motors, with very low losses and high current sense accuracy, all monitored via the connections to the ECU microcontroller.

The new VIPOWER M0-9 SPI drivers feature full digital diagnostics with embedded ADC for load current sensing. These new devices implement sophisticated software logic that also simplifies AUTOSAR compliance.

Designed to replace standard melting fuses in automotive power distribution systems, our new STi<sup>2</sup>Fuse smart switches feature wire harness protection on top of the typical high-side driver functions for additional savings on component and production costs, while extending EV range and reducing the carbon footprint of vehicles.



## TRANSIL

TRANSIL is a key planar technology for our Automotive transient voltage suppressors (TVS) designed to protect automotive sensitive circuits against surges as defined in ISO 7637-2 and ISO 16750 also called load-dump (battery lines), ISO 7637-3 (data lines) and ESD as defined in ISO 10605. Protection is also provided against other perturbations generated by elements like ignition, relay contacts, alternators, injectors, SMPS, etc.

This technology is compatible with high-end circuits where low leakage current and high junction temperatures are required to provide reliability and stability over time.

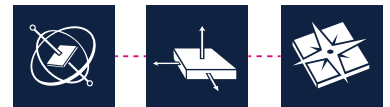


## Data line ESD protection

ST's automotive data line ESD protection devices include transient voltage suppressors (TVS) and application-specific discrete devices that provide system level protection against ESD surges according to standard IEC 61000-4-2. ESD protection devices are manufactured using automotive-grade processes and qualified to AEC-Q101 standards. As such, they can address all automotive applications and domains including advanced driver-assistance systems (ADAS), vehicle-to-everything (V2X), CAN-FD, SerDes (serializer/deserializer), and Ethernet Base-T standards to name just a few, in order to achieve immunity with the very low clamping voltage. Moreover, ST offers innovative, miniature wettable flank DFN packages to ease Automatic Optical Inspection (AOI).

## A growing and diversified portfolio of MEMS and sensor solutions

Enabling the transition to a sustainable Onlife era, ST offers an extensive MEMS sensor portfolio based on more than 25 years of experience and innovation. Moreover, our new generation of MEMS sensors features an embedded intelligent sensor processing unit (ISPU) to help meet the challenges of incorporating AI into energy-saving Edge-based applications.



Our sensors offer three key attributes:

- Capable of directly processing the data they capture and delivering meaningful insights in the local device, **smart sensors** reduce transmitted data and cloud processing requirements, thus lowering power consumption at the system level.
- Able to interface with other sensor applications, our **open sensors** let third parties benefit from ST's in-sensor processing innovations, while building an ecosystem to jointly create value for customers.
- Providing high-precision data that allows better quality decisions and makes interactions smoother and more natural, our **accurate sensors** also reduce factory calibration time and resources, which also reduces energy needs.

To reduce design costs and effort for a more rapid time to market, our comprehensive ecosystem includes helpful developer resources with ready-to-use boards as well as software tools and real-life example code.

# Development Tools

## EVALUATION BOARDS, eDESIGN SUITE, AND SOFTWARE TOOLS

ST provides a set of eDesign suites tuned to the needs of the Automotive Industry. Once the appropriate products have been selected, a wide range of samples and evaluation boards are available to help you get started and reduce your development times. In addition to boards, ST provide schematics, BOM and Gerber files to facilitate your hardware design and demonstration software packages are also available.

### Evaluation kits

Product evaluation kits help you design, test, and calibrate your automotive application. A wide range of boards is available to evaluate the specific features of products and solutions in their applications. A complete set of documents and resources including circuit diagrams and bills of material as well as reference guides is available. Additional software including ready-to-use example code and user-friendly GUIs complete our offer.



**FIND OUT MORE**  
[www.st.com/automotive-evalboards](http://www.st.com/automotive-evalboards)

## eDesignSuite

eDesignSuite is a comprehensive set of easy-to-use design-aid utilities ready to help you streamline the system development process with a wide range of ST products.



### TwisterSIM

TwisterSIM is an off-line Electro-Thermal simulator for our VIPower automotive power devices. It helps shorten design solution cycle by enabling complex evaluations including load-compatibility, wiring harness optimization, fault condition impact and diagnostic behavior analysis and Dynamic Thermal performance.



### STPOWER Studio

The STPOWER Studio dynamic electro-thermal simulation software offers comprehensive power and thermal analysis for a growing number of STPOWER devices. It helps users select the best power device for the specific application mission profile and predicts device behavior under given operating conditions.



### Rectifier diodes simulator

With just a few clicks our on-line FERD & Schottky diode simulator lets you estimate power losses based on application waveforms and select the best components for your solution.



### AC switch simulator

Our AC switch simulator provides graphs of estimated temperature and voltage blocking capabilities to so you can quickly determine the best switch for your solution.



### TVS simulator

Simply specify the surge input waveform and system ratings to be protected and this intuitive simulator lets you sort and select the best TVS protection for your design.



### FIND OUT MORE

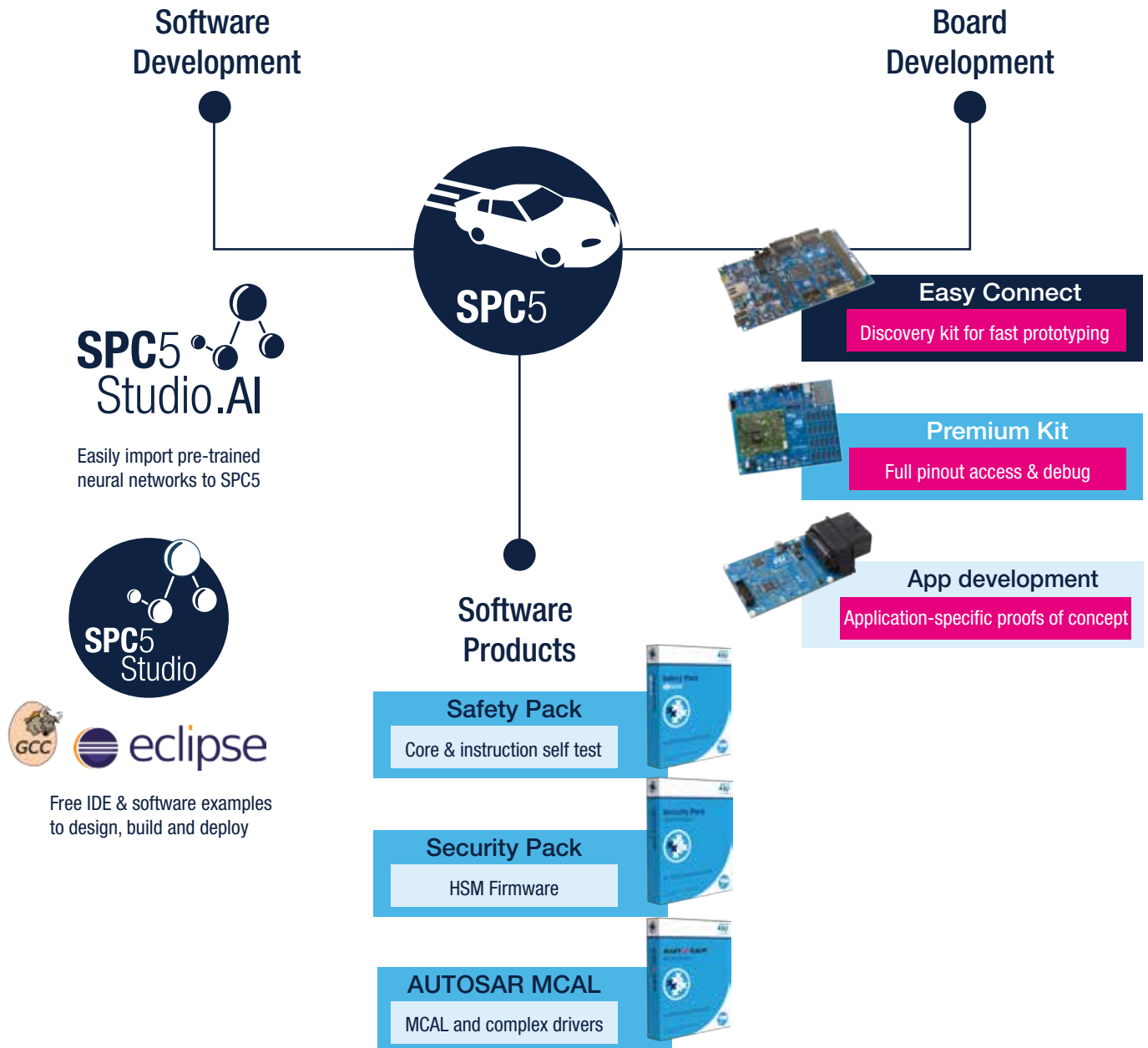
[www.st.com/edesign](http://www.st.com/edesign)

## COMPREHENSIVE SPC5 AUTOMOTIVE MCU DEVELOPMENT ECOSYSTEM

A rich ecosystem with a full set of hardware and software tools allows developers to save time, simplify implementation, quickly prototype their application and benefit from ready-to-use boards and example code. ST offers a wide set of hardware kits ranging from quick evaluation tools to modular and professional boards for developing final proofs-of-concept.

Together with free downloadable SPC5Studio Integrated Development Enviroments (IDE), engineers can easily set up application projects in a short time. SPC5Studio contains a wide selection of example code for starting projects. Additionally, ST offers a set of licensed software packs addressing Safety, Security and AUTOSAR MCAL components.

ST's network of 3rd parties and partners complement the offer with hardware, such as debugger probes, and software tools including compilers and other services.



**FIND OUT MORE**  
[www.st.com/auto-sp5-mcu-evaltools](http://www.st.com/auto-sp5-mcu-evaltools)

## STELLARLINK FAST PROTOTYPING FOR AUTOMOTIVE MCUs

StellarLINK is a USB to JTAG passive debugger dongle for Automotive MCUs. It supports SR5, SR6, and SPC5 automotive microcontrollers and their evaluation boards. StellarLINK is Integrated into StellarStudio and SPC5Studio

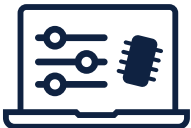
**ST programmer & debugger**



Supporting Stellar SR5, SR6, and SPC5 MCUs



Plug & Play with evaluation boards



Extending Stellar & SPC5 ecosystem



Eco-friendly packaging



**FIND OUT MORE**

[www.st.com/en/development-tools/stellarlink.html](http://www.st.com/en/development-tools/stellarlink.html)



## SPC5 SOFTWARE TOOLS



SPC5Studio is a built-on Eclipse plug-in development environment offering a very intuitive and customizable framework to build and deploy embedded applications for SPC5 Power architecture 32-bit microcontrollers.

Integrating software development tools, device configuration tools and examples, SPC5Studio is a complete solution to speed up project development.

Available free for download on the [st.com](https://www.st.com) website.



SPC5Studio includes **SPC5Studio.AI**, a plug-in for Artificial intelligence-based applications, a seamless way to generate, execute and validate pre-trained NN models on automotive MCUs.

Pre-trained neural networks can be automatically generated into an efficient “ANSI C” library that can be compiled, installed and executed.

Pre-trained neural networks can be easily imported by SPC5Studio.AI from the most widely used deep learning frameworks, such as Keras, TensorFlow Lite, Lasagne, Caffe, ConvNetJS, and ONNX.

## SOFTWARE PRODUCTS



**SPC5 Security Pack** provides basic capabilities to support root-of-trust (RoT) where private encryption keys are kept secret during the microcontroller lifetime using a dedicated location inside the OTP space. To further ensure application security, encryption and decryption functionalities are fully executed on the HSM core.



**SPC5 Safety Pack** is a comprehensive software package rigorously developed according to an ISO 26262-compliant development process, and helps developers achieve the required safety target, up to the most rigorous ASIL-D level. It includes a Safety kit for the Microcontroller Abstraction Layer (MCAL) as well as Core self-test programs that implement safety counter-measures to ensure compliance with MCU ASIL level requirements.



**SPC5 AUTOSAR MCAL Driver** offers a full set of Microcontroller Abstraction Layer software components in addition to Complex Device Drivers (CDD) to support specific hardware peripherals. MCAL software components are developed in house, through an ISO 26262-certified development process. ST's CDD and MCAL drivers are integrated by 3rd party partners with all the components required for the AUTOSAR architecture including basic software layer and OS, offering a complete off-the-shelf AUTOSAR solution.

ST Security Pack, Safety Pack and AUTOSAR MCAL Pack are licensed products.

## AutoDevKit AUTOMOTIVE DEVELOPMENT INITIATIVE

AutoDevKit 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.

Our 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



Once the MCU platform and the functions needed for the application are selected, the developer can start from existing demo codes and customize them using high-level programming, without going into deep technical details.

The automatic pin configuration and the visual procedure enable an easy board assembling with the correct wiring and the embedded debug allows to get a working prototype quickly.

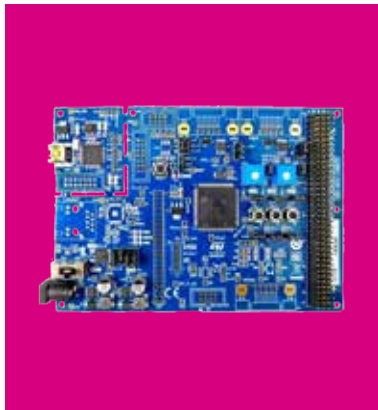


**FIND OUT MORE**  
[www.st.com/autodevkit](http://www.st.com/autodevkit)

## THE AUTODEVKIT ECOSYSTEM INCLUDES:

- MCU Discovery and Functional boards
- System solution and demonstrators
- Embedded software and firmware components and tools

**MCU Boards**



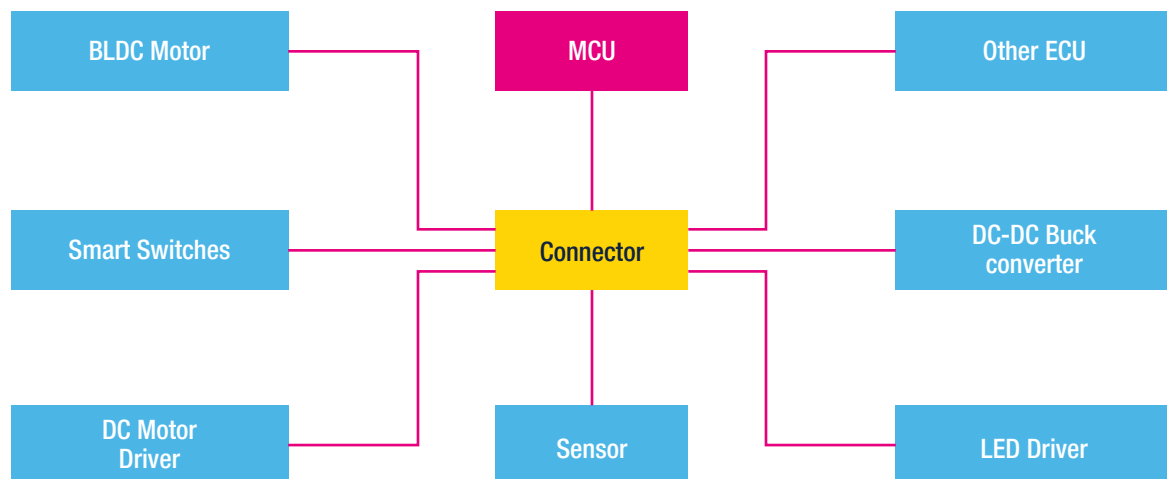
**Connector Boards**



**Functional Boards**



### Solution /Demonstrator KIT



MCU + Connector + Functional boards

# life.augmented



Order code: BR2309AUTOBC

For more information on ST products and solutions, visit [www.st.com](http://www.st.com)

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