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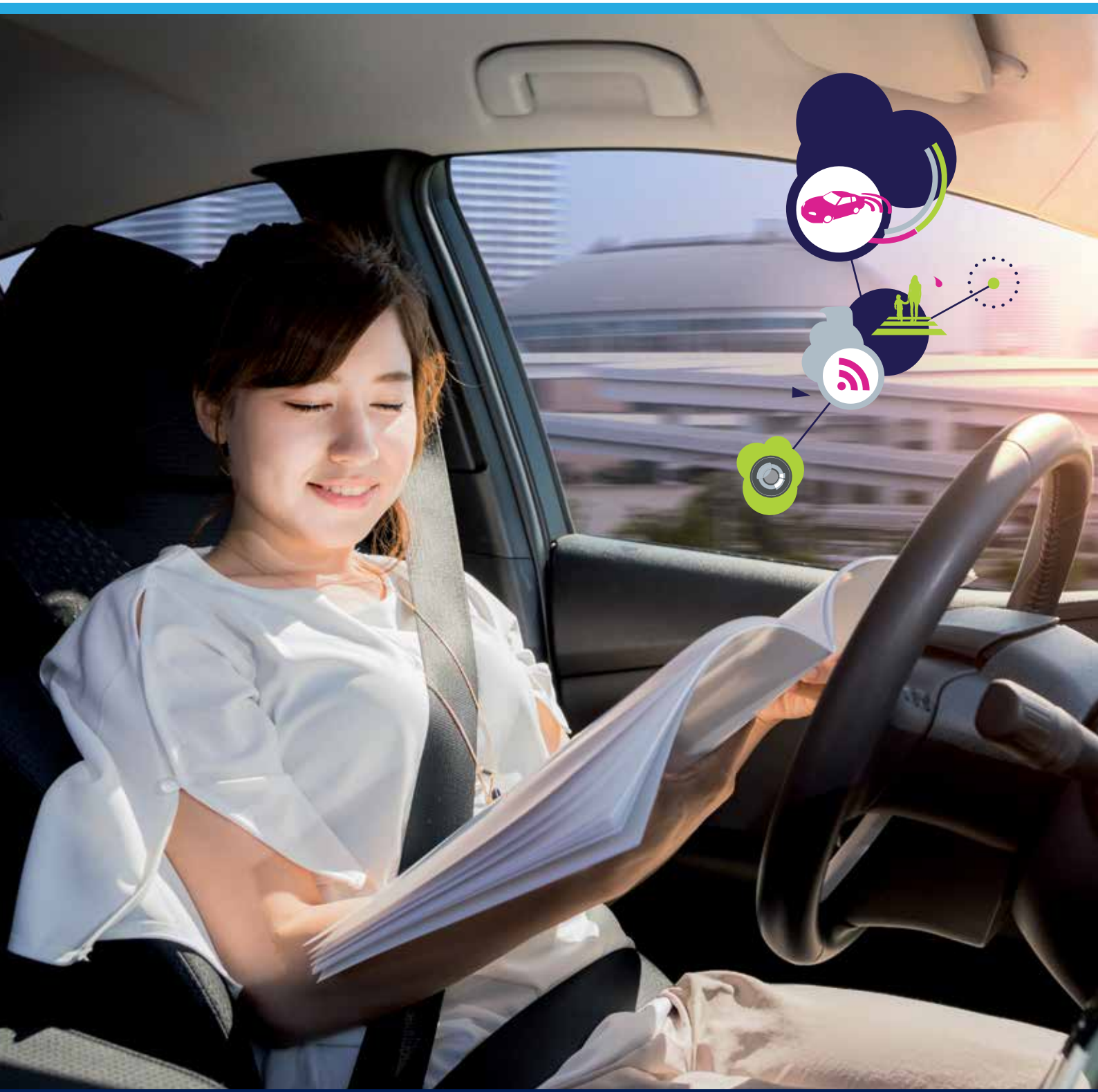
Solutions for Smarter Driving
ADAS



Content

Smart Driving

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 Driving products and solutions are making driving safer, greener and more connected through the combination of several of our technologies.

SAFER

Driving is safer thanks to our Advanced Driver Assistance Systems (ADAS) products – 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 units engine management systems, high-efficiency smart power electronics at the heart of all automotive sub-systems and Silicon Carbide devices for hybrid and electric vehicle applications.

MORE CONNECTED

And vehicles are more connected using our infotainment-system and telematics processors and sensors, as well as our radio tuners and amplifiers, positioning technologies, and secure car-to-car and car-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.

ADAS

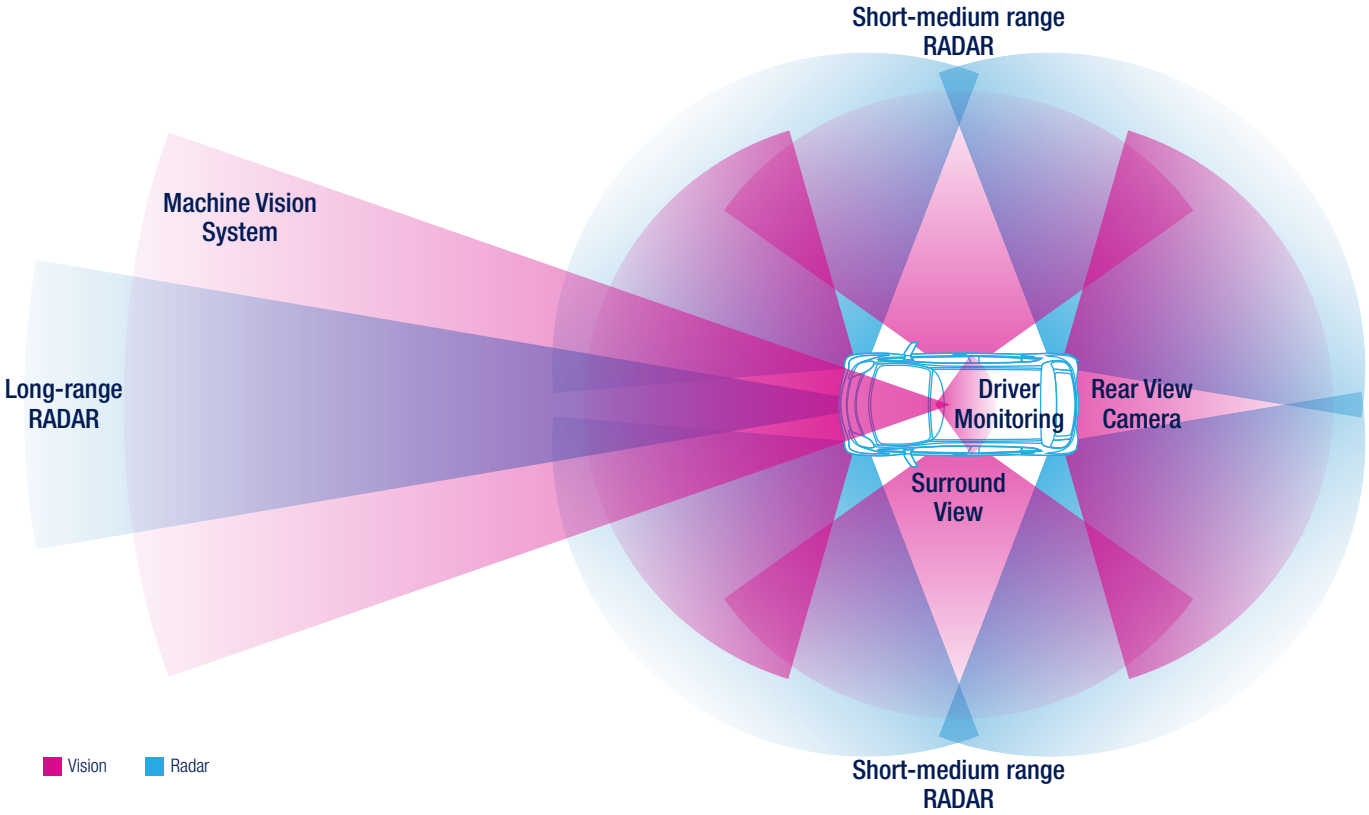
Advanced Driver Assistance Systems (ADAS) aim to drastically reduce road accidents and the associated casualties by helping drivers avoid collisions altogether. These systems react faster than any human, are constantly vigilant, and are already being adopted and deployed across various car segments, from premium to economy models.

ADAS systems constantly monitor the vehicle surroundings, alert the driver of hazardous road conditions, and take corrective actions, such as slowing or stopping the vehicle. These systems use inputs from multiple sensors, such as cameras and radars. The fusion of these inputs is processed and the information is delivered to the driver and other parts of the system. The same sensor technologies can be used both in the current ADAS systems and in the upcoming fully autonomous driving systems (level 4 and 5).

Camera-based technologies provide high-reliability and adaptability for a wide-range of driver assistance applications, for example lane keeping, pedestrian detection, traffic sign recognition, rear view camera, driver monitoring, electronic mirror. Radar-based ADAS uses two different carrier frequencies, 24 GHz for narrow band and 77 GHz for wide band applications, to support features such as blind-spot detection, automatic emergency braking and adaptive cruise control.

ST has a leading-edge product portfolio including 24 GHz and 77 GHz Monolithic Microwave Integrated Circuits (MMIC), CMOS High Dynamic Range (HDR) image sensors and advanced Image Signal Processors (ISP) with dedicated HW engines for video analytics and lens correction. ST also has a wide range of Automotive Microcontrollers, Security ICs and Power Management ICs to ensure the reliability of the mission critical ADAS systems.

KEY APPLICATIONS



SOLUTIONS

ST's key products and solutions for ADAS applications include:

Image Signal Processor	Power Management	EOS and ESD Protection	32-bit Automotive Microcontrollers	HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors
Image Sensor	Automotive Radar Transceiver	Ultrafast and Schottky diodes		
HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors				

Smart Driving

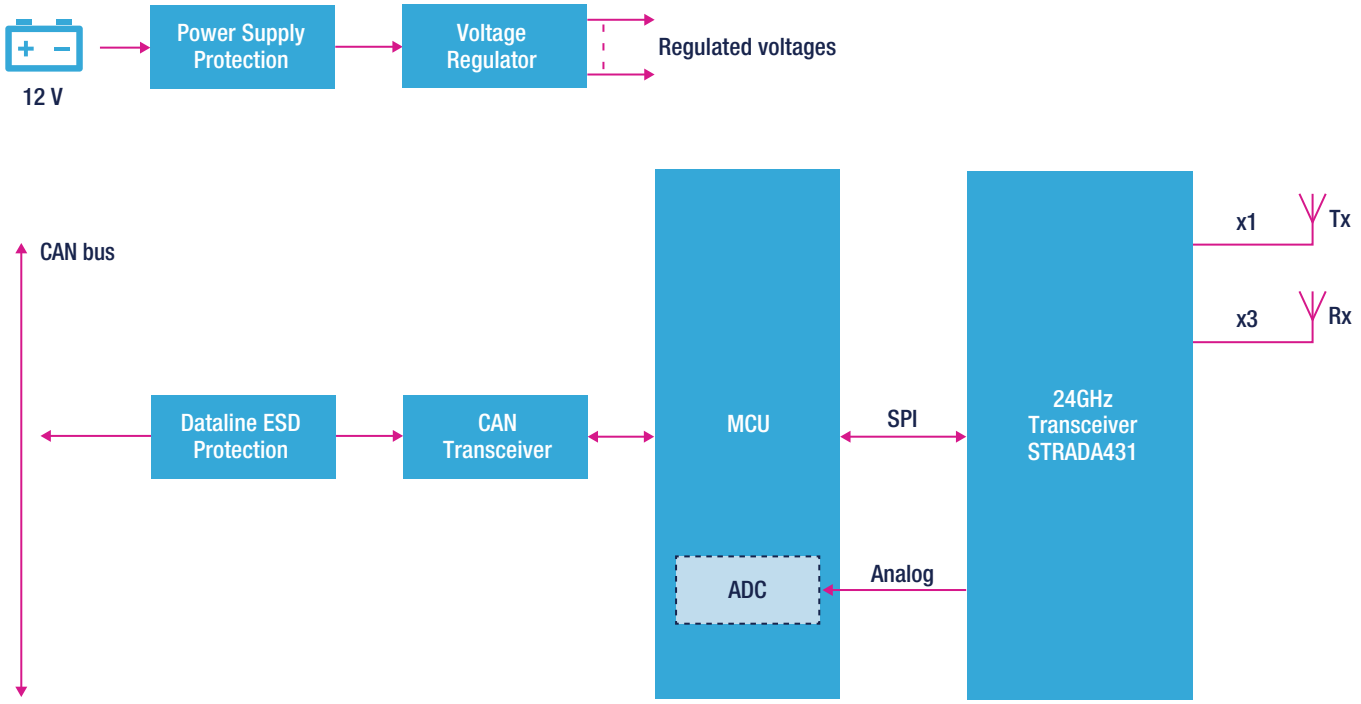
FIND OUT MORE

www.st.com/adas

24 GHz RADAR

24 GHz radars are used to sense the environment around the vehicle and offer a proven and cost effective solution. These radar systems are aimed at features such as blind-spot detection, rear cross traffic alerts, collision avoidance and for simpler AEB and ACC systems.

STRADA431 24 GHz transceiver Monolithic Microwave Integrated Circuit (MMIC) includes one transmitter and three receivers and is specifically designed for use in Advanced Driver Assistance Systems (ADAS). It integrates voltage regulators to supply the internal core to simplify system design and is fully configurable via a simple SPI interface.



FIND OUT MORE

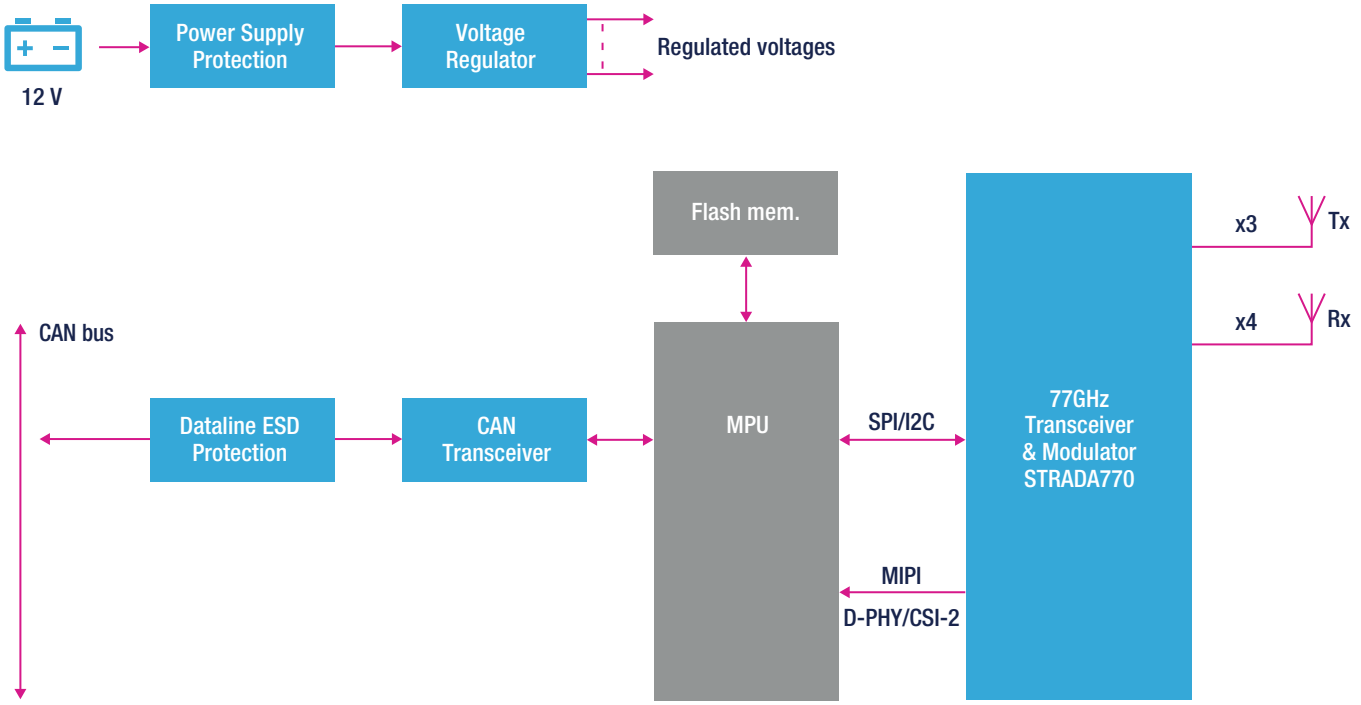
www.st.com/24-ghz-radar

77 GHz RADAR

77 GHz radars enhances automotive safety by enabling vehicles to identify dangerous situations and prevent crashes. They are used to detect different kinds of obstacles such as other vehicles and pedestrians in the 30 to 250 meters range, even in low visibility conditions.
The information provided by the radars is used in ADAS system responsible for multiple applications including autonomous emergency braking and adaptive cruise control.

STRADA770 transceiver, covering the millimeter wave (mmWave) frequency band from 76 to 81 GHz, is designed to provide an optimized solution for high-end ADAS systems. It includes 3 transmitters, 4 receivers and a chirp modulator.

An evaluation kit for developers is available with a STRADA770 evaluation board (EVB-STRADA770) and GUI for programming the IC from a PC using a USB interface.

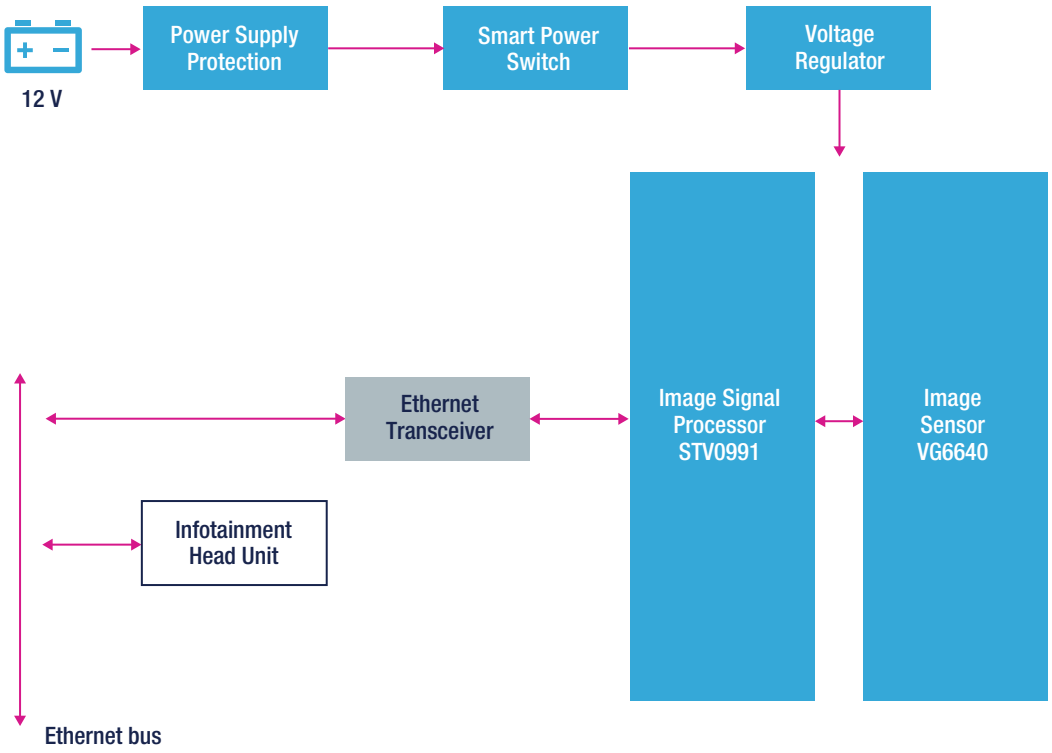


FIND OUT MORE

www.st.com/77-ghz-radar

SMART AUTOMOTIVE CAMERAS

ST smart cameras enable ADAS applications like rear or surround view systems and electronic mirrors. Our chip sets include state-of-the-art HDR image sensors and versatile image signal processors that provide excellent flicker-free image quality at HD resolution. Real time processing eliminates the need for costly external memory. Dedicated functions are available for fish-eye correction, detection of moving objects, trajectory and obstacle overlays, H264 or JPEG compression and a variety of interfaces including Ethernet.



FIND OUT MORE

www.st.com/smart-automotive-cameras

Key Technologies

RESEARCH & DEVELOPMENT AND MANUFACTURING

To keep its technology edge, ST maintains a strong commitment to innovation, with approximately 7,400 people working in R&D and product design and spending about 16% of its revenue in R&D. Among the industry's global technology leaders, ST owns and continuously refreshes a substantial patent library (~17,000 patents; ~9,500 patent families and ~500 new patent filings per year).

The Company 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), Silicon Carbide, VIPower, and MEMS technologies.

ST believes in the benefits of owning manufacturing facilities and operating them in close proximity and coordination with 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.

Development Tools

PRODUCT SELECTORS, SAMPLES, EVALUATION BOARDS

ST provides a set of Smart Selectors 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 provides schematics, BOM and Gerber files to facilitate your hardware design and demonstration software packages are available too.

Product Selectors

Rapidly find the most relevant automotive products for your designs.

Evaluation Boards

ST evaluation boards help you evaluate the features and performance of selected products and system solutions that demonstrate optimized and tested solutions for your application design.

SPC5 AUTOMOTIVE MCU EVALUATION TOOLS: EASIER EVALUATION AND FASTER DEVELOPMENT

A complete range of hardware evaluation and emulation tools supports the SPC5 family of automotive microcontrollers. Discovery and Premium development boards are available to support your development from preliminary evaluation through to advanced solution development.

ST Discovery boards, available for each product line enable a quick and easy way to evaluate the microcontroller's main features. The expansion connector makes it easy to plug in application and extension modules for rapid prototyping.

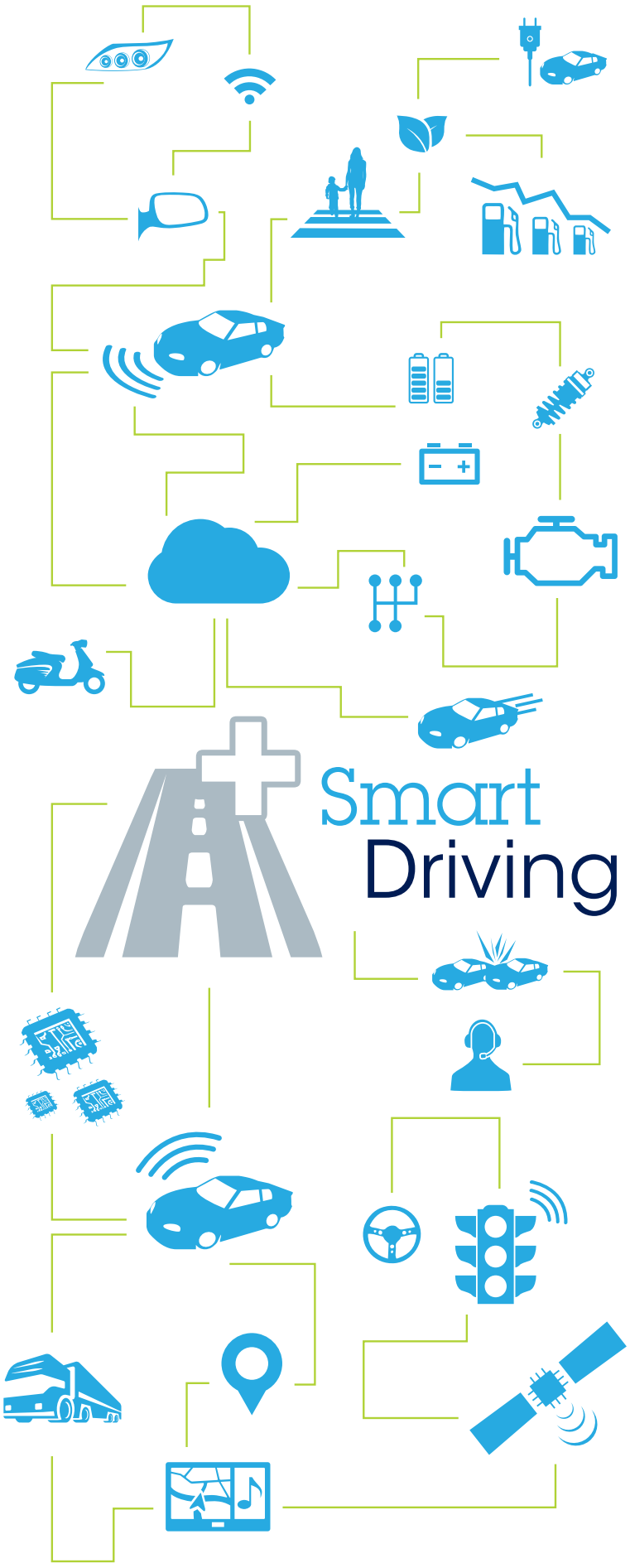
ST Premium boards, available for all lines and packages provide user access to the device's complete feature set and functionalities for advanced development. The SPC5 motherboards, used in combination with adapters, enable full access to all of the MCU's signals and peripherals (such as CAN, SPI, LIN, FlexRAY and Ethernet).

The offer is complemented by a series of emulation solutions for high-speed tracing, monitoring and bypassing.

A full range of state-of-the-art tools and software from major third parties is also available for the SPC5 family of automotive microcontrollers.

FIND OUT MORE

www.st.com/auto-spc5-mcu-evaltools


Smart
Driving

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Solutions for Smarter Driving
Electro-Mobility

Content

Smart Driving

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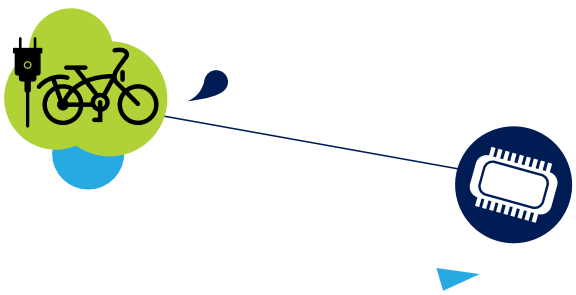
Electro-Mobility

The electrification of vehicles is increasing rapidly, driven by the availability of higher-performance and more cost-effective battery technologies, and improved mileage vehicles as well as ecological awareness, and government incentives and regulation.

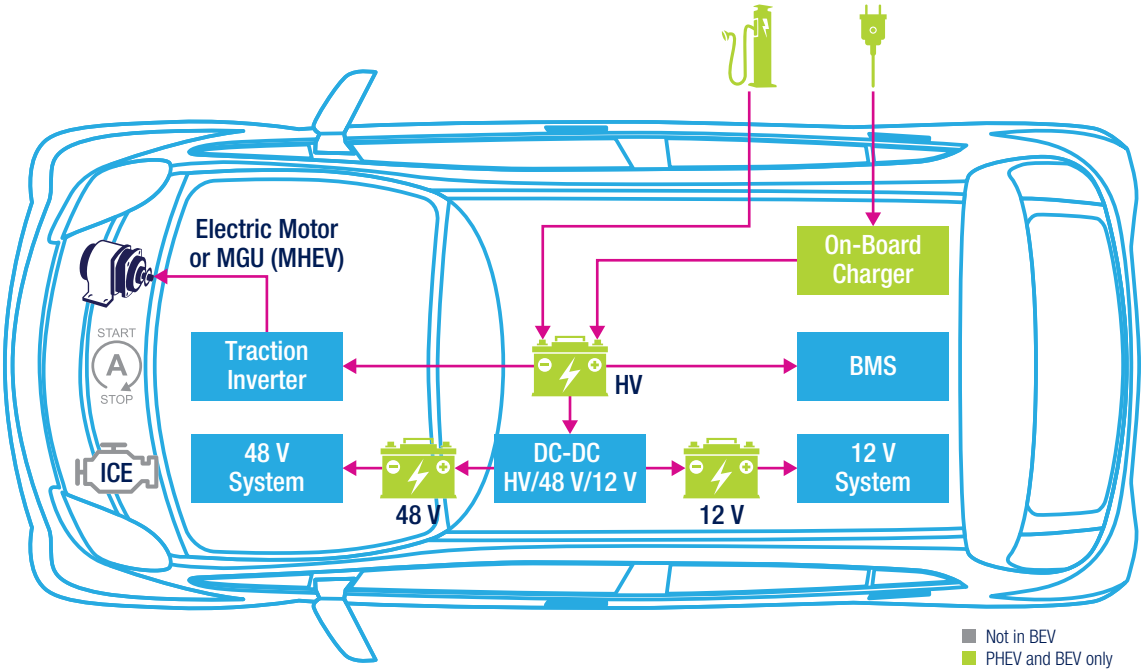
ST provides leading-edge solutions for hybrid (HEV), and battery electric vehicles (BEV) based upon proven and innovative technologies and backed up with our extensive power management experience.

Best-in-class, silicon and SiC (Silicon Carbide) MOSFETs and diodes, IGBTs, 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.

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



KEY APPLICATIONS



SOLUTIONS

ST's key products and solutions for Electro-Mobility applications include:

SiC MOSFETs and Diodes	Transceivers	Signal Conditioning	Power Management	32-bit Automotive Microcontrollers
Power MOSFETs and IGBTs	Power Diodes and Thyristors	EOS and ESD Protection	BCD Integrated and Isolated Drivers	

HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors

Smart Driving

FIND OUT MORE

www.st.com/electro-mobility

Battery Management System (BMS)
Charging Station
DC-DC Converter
Electric 2-wheelers
Electric Traction (Main Inverter)
Mild Hybrid 48 V Systems
On Board Charger (OBC)

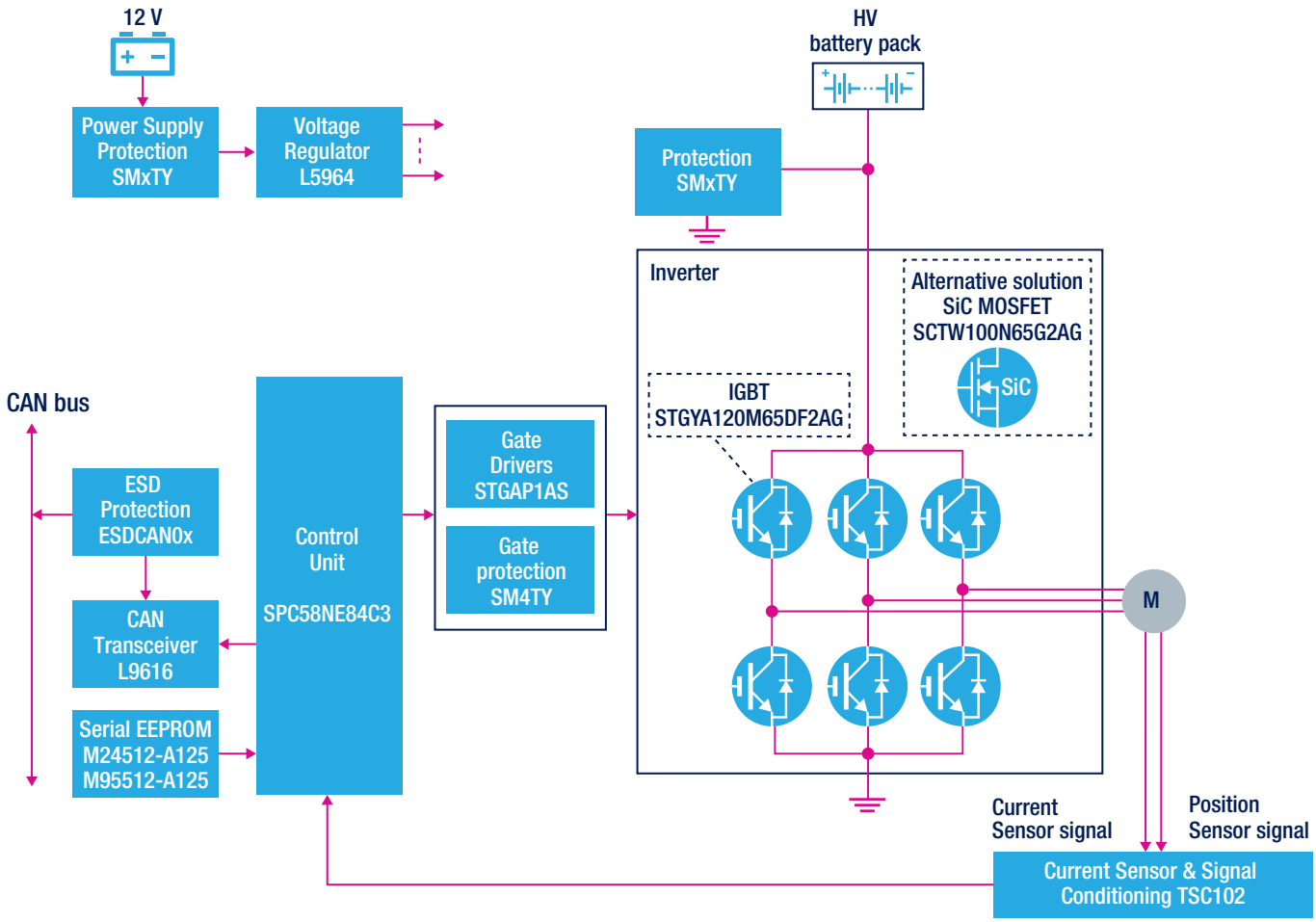
TRACTION MAIN INVERTER

The traction inverter converts energy from the vehicle's battery 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 intense heat and vibration of the automotive environment, these converters must be able to handle high power and currents along with associated Electro Magnetic Compatibility (EMC) challenges. Fail-safe operation needs to be assured to ensure reliability and safety for the driver and passengers.

To help developers increase the inverter's power efficiency and reduce size and weight, ST has a wide offer of discrete semiconductors including AEC-Q101 qualified silicon and silicon-carbide (SiC) MOSFETs and diodes as well as IGBTs. These are complemented by AEC-Q100 qualified galvanically isolated IGBT and MOSFET gate drivers and SPC5 32-bit automotive microcontrollers for implementing scalable, cost-effective and energy-efficient solutions.

Main Inverter



FIND OUT MORE

www.st.com/main-inverter-electric-traction

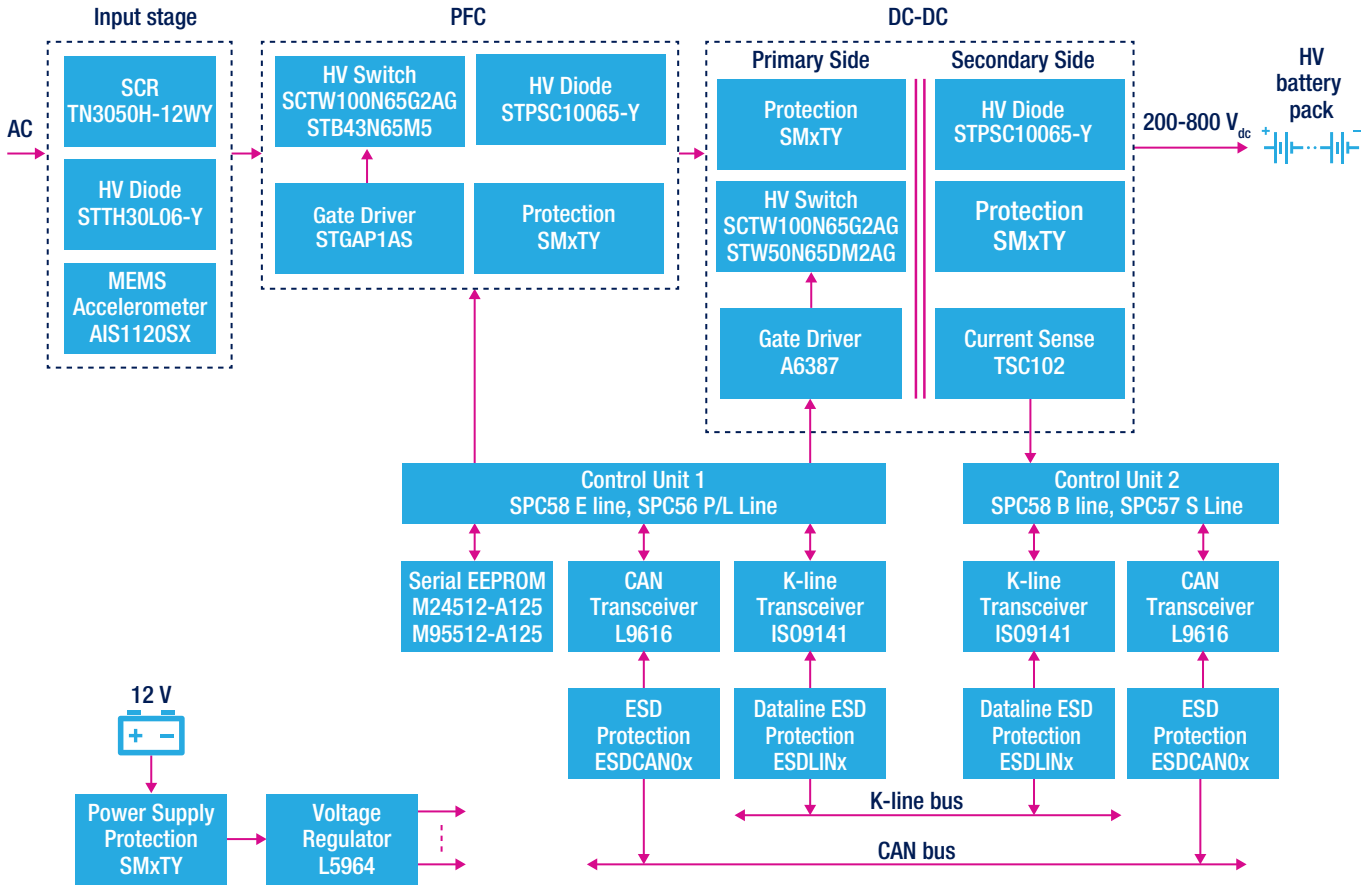
ON-BOARD CHARGER (OBC)

At the heart of any electric (EV) or plug-in hybrid (HEV) vehicle lies 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 must have the highest possible efficiency and reliability to ensure rapid charging times as well as meet the limited space and weight requirements.

ST has a wide offer of discrete semiconductors including AEC-Q101 qualified silicon and silicon-carbide (SiC) MOSFETs and diodes as well as IGBTs. These are complemented by AEC-Q100 qualified galvanically isolated IGBT and MOSFET gate drivers and SPC5 32-bit automotive microcontrollers for implementing these challenging converters.

OBC



FIND OUT MORE

www.st.com/on-board-charger

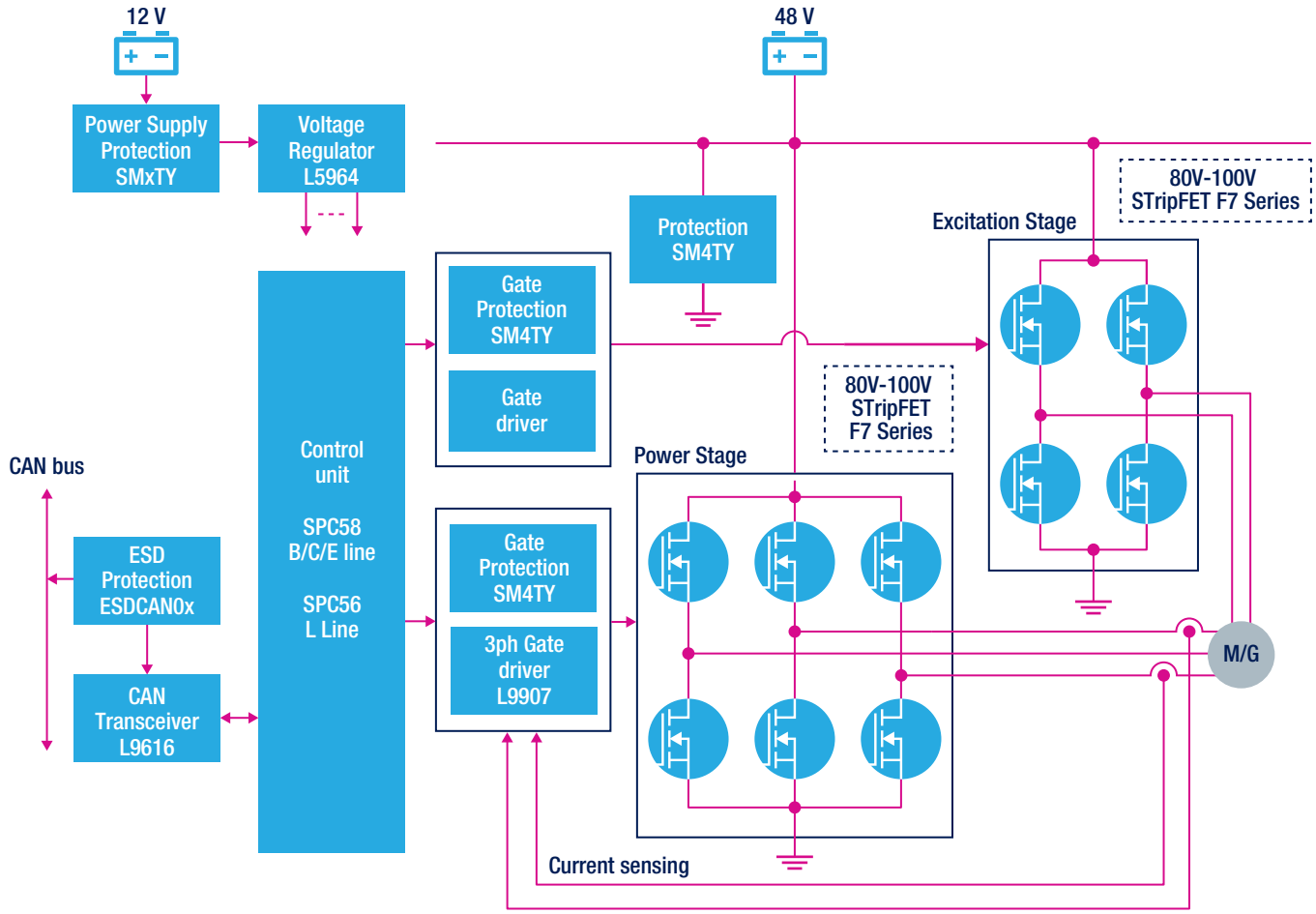
48V START-STOP SYSTEM

A Start-Stop system automatically shuts down and restarts the internal combustion engine to reduce the amount of idle time, thereby improving fuel economy and reducing CO_2 emissions. This is especially useful in urban traffic environments where vehicles can spend significant amounts of time in traffic.

This requires power electronics that can handle high current during cranking and ensure reliability during engine cycles operating on/off at high temperatures.

ST's solutions include silicon power MOSFETs, protections, gate drivers and microcontrollers, in accordance to AEC-Q100 and AEC-Q101 standards.

Start-Stop system



FIND OUT MORE

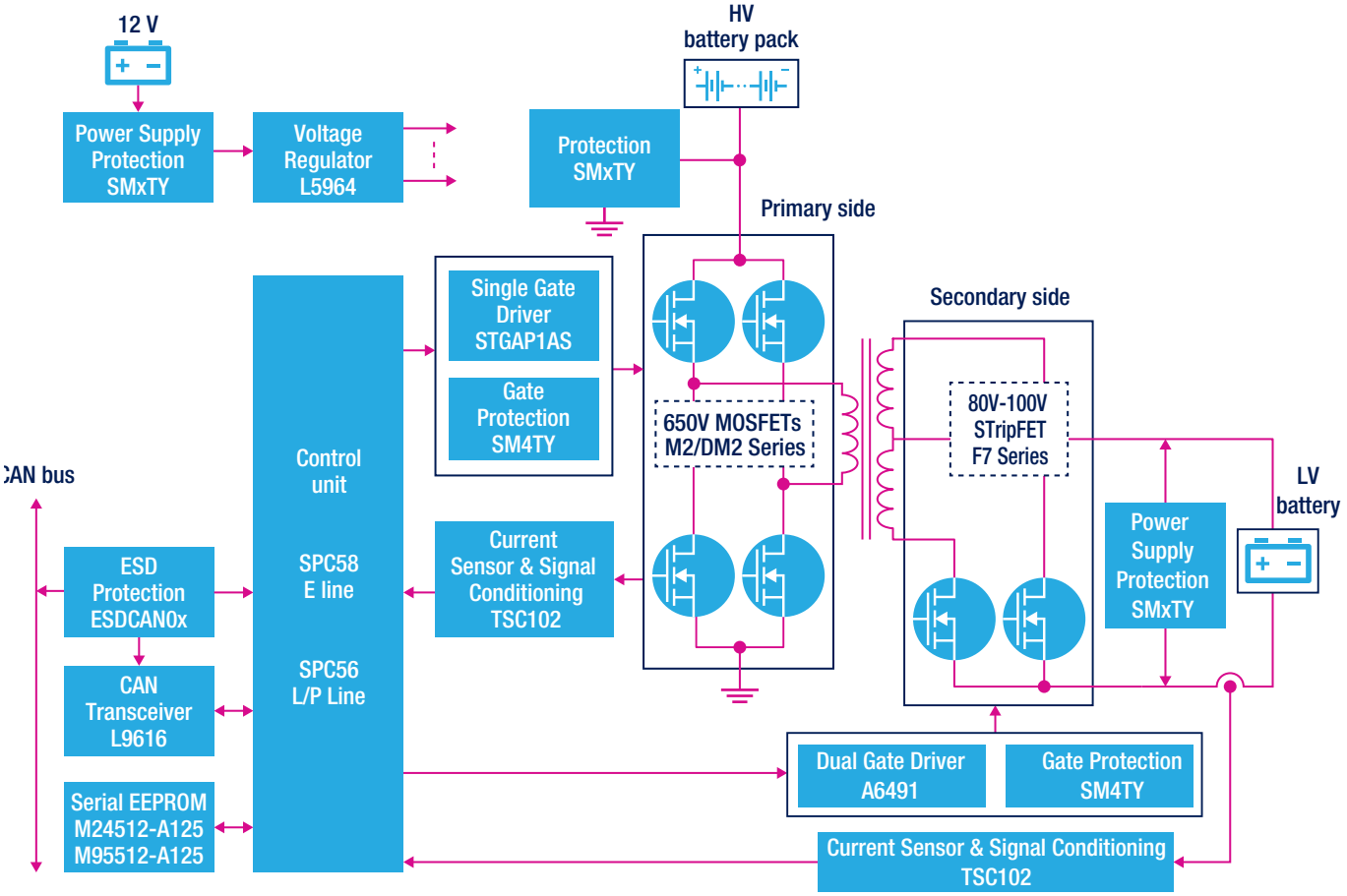
www.st.com/48v-start-stop-system

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 (12/48V) 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.

ST has a wide offer of discrete semiconductors including AEC-Q101qualified silicon and silicon-carbide(SiC) MOSFETs and diodes as well as IGBTs. These are complemented by AEC-Q100 qualified galvanically isolated IGBT and MOSFET gate drivers and SPC5 32-bit automotive microcontrollersto enable scalable, cost-effective and energy-efficient solutions for implementing these challenging converters.

Bidirectional DC/DC Converter



FIND OUT MORE

www.st.com/bidirectional-dc/dc-converter

Key Technologies

RESEARCH & DEVELOPMENT AND MANUFACTURING

To keep its technology edge, ST maintains a strong commitment to innovation, with approximately 7,400 people working in R&D and product design and spending about 16% of its revenue in R&D. Among the industry's global technology leaders, ST owns and continuously refreshes a substantial patent library (~17,000 patents; ~9,500 patent families and ~500 new patent filings per year).

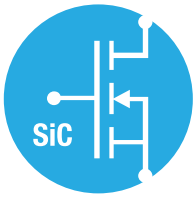
The Company draws on a rich pool of chip-manufacturing technologies, including advanced FD-SOI (Fully Depleted Silicon-on-Insulator) CMOS (Complementary Metal Oxide Semiconductor), differentiated Imaging technologies, RF-SOI (RF Silicon-On-Insulator), BiCMOS, BCD (Bipolar, CMOS, DMOS), Silicon Carbide, VIPower™, 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

Silicon Carbide

Silicon Carbide (SiC) is a wide bandgap material, with many advantages compared to silicon in the field of power electronics. Operating temperatures are higher, heat dissipation is improved and switching and conduction losses are lower making it an ideal technology for vehicle electrification. Silicon Carbide based traction inverters can increase electric vehicle range and SiC based chargers reduce the charge time.



ST produces the automotive-grade SiC power devices, in a dedicated 6" front-end wafer fab, that are becoming the key enabler in the automotive industry for vehicle electrification.

VIPower™

VIPower™ is a technology developed by ST and in production since 1991. Vertical Intelligent Power technologies provide 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- Mixed design.

VIPower™ technology will play a key role in the move towards electric vehicles. The smart 48 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 ECUs microcontroller.

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. For EV charging BCD is ideal for battery management systems.

1200V AEC-Q101 qualified technologies for EV charging

High voltage rectifier and thyristor technologies are the keys to develop robust, immune AC line connected systems exhibiting high power density. ST has developed a set of automotive grade technologies for full rectification functions in the low frequency (AC line) or high frequency ranges (DC-DC conversion). AEC Q101 qualified, this rectifier diode and thyristor series are available to design robust converters compatible most stringent electromagnetic norms such as burst or surge voltages.

TRANSIL™ :

TRANSIL™ is a key planar technology for Automotive TVS series designed to protect automotive sensitive circuits against surges as defined in ISO 7637-2 and ISO 16750 tests A and B also called load-dump (battery lines), ISO7637-3 (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.

STPOWER

Leading-edge power technologies for both high-and low-voltage applications combined with a full package range and innovative die bonding technologies exemplify ST's innovation in power transistors of the STPOWER™ family. ST offers a wide portfolio of power MOSFETs ranging from -100 to 1700 V, IGBTs with breakdown voltages ranging from 300 to 1250 V and power bipolar transistors ranging from 15 to 1700 V. Improved thermal design of ST's power electronics systems, and our silicon-carbide (SiC) MOSFETs ensure automotive robustness with the industry's highest temperature rating of 200 °C. Our extensive STPOWER™ product portfolio combined with state-of-the art packaging and protection solutions enable designers to create products with high reliability, efficiency and safety.

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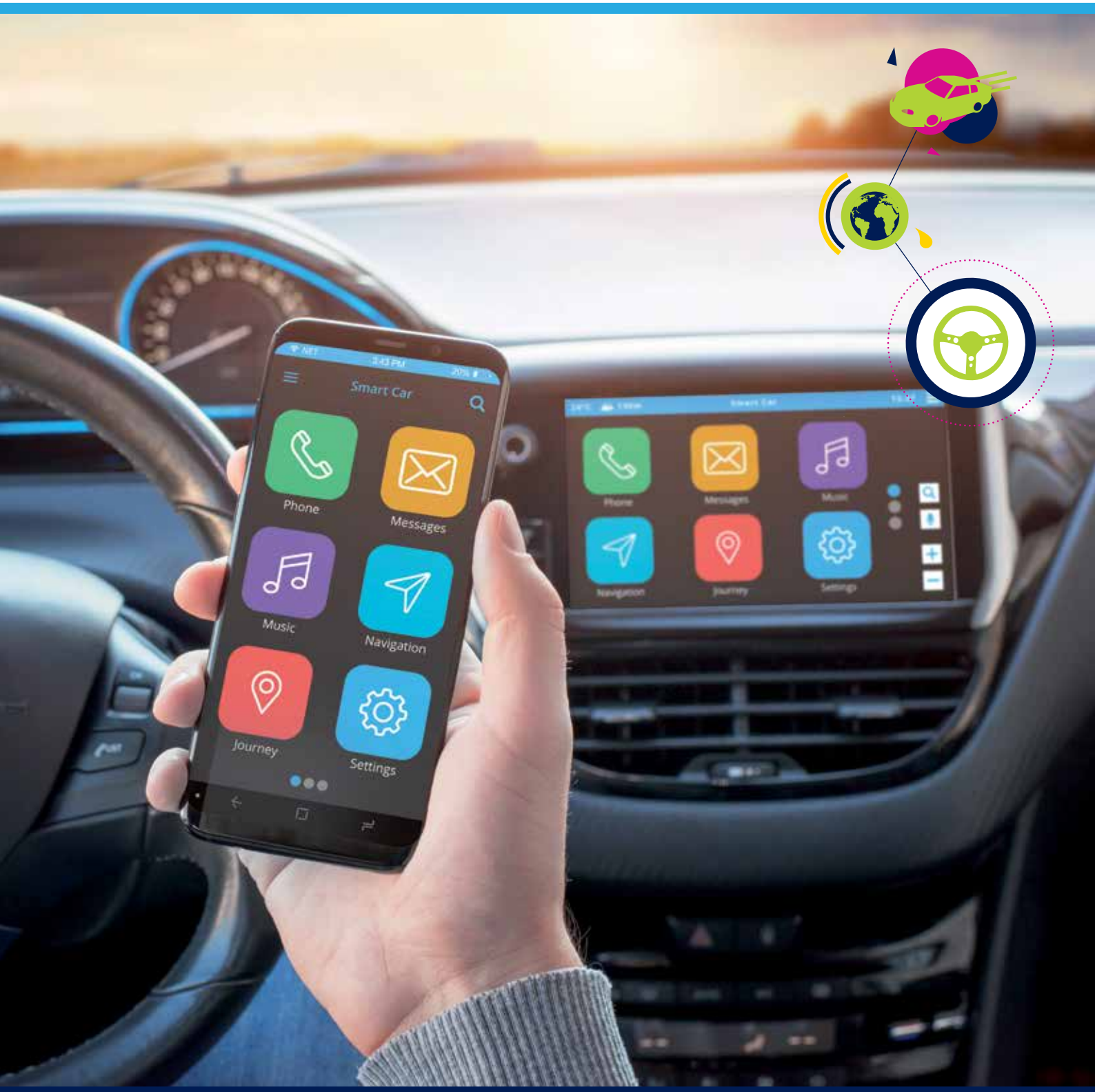
Solutions for Smarter Driving
In-vehicle Infotainment



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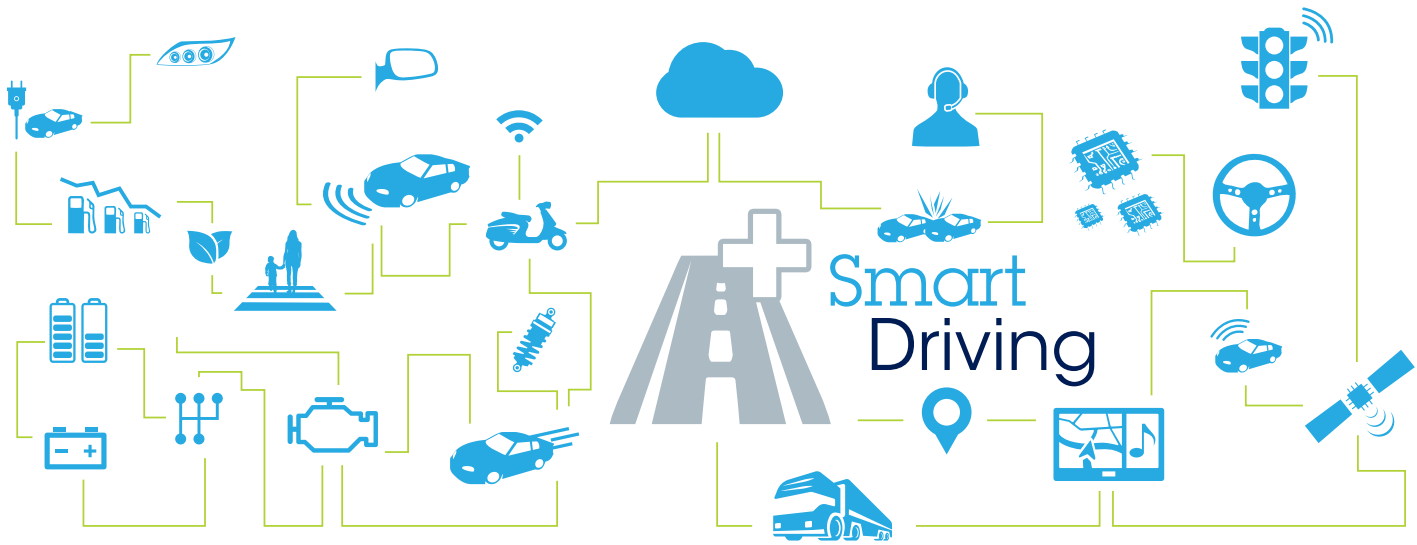


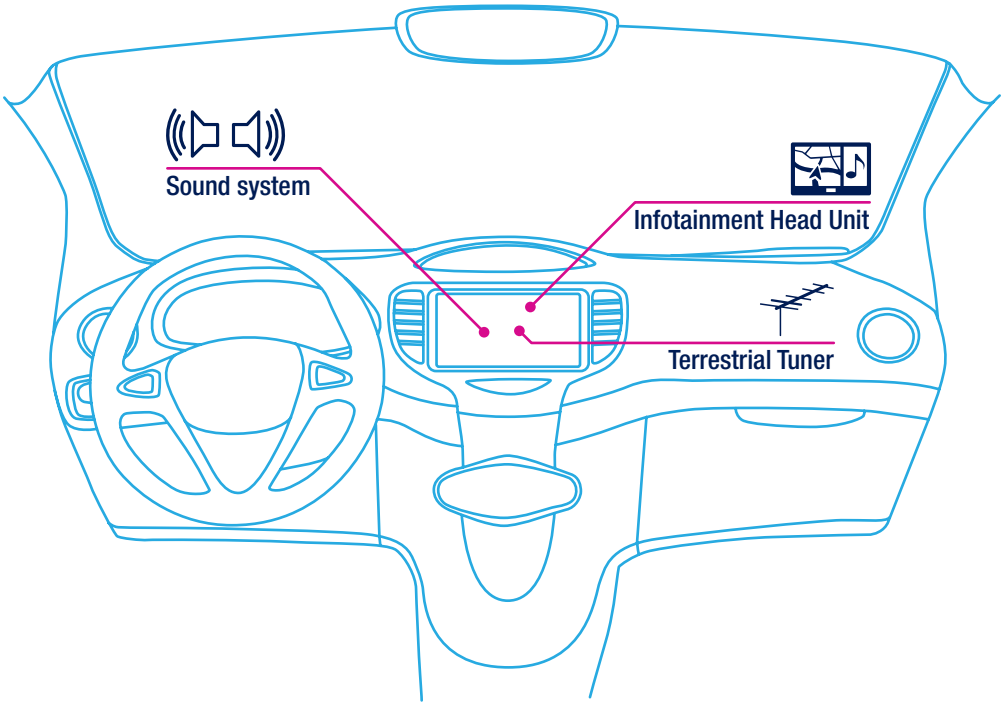
In-Vehicle Infotainment

Consumer experiences with personal electronics are shaping expectations for in-vehicle infotainment systems making it a fast-evolving segment of the automotive industry. Vehicle occupants expect to be entertained, connected and able to seamlessly access information and content from a variety of sources.

At ST, we have been developing innovative integrated circuits for in-vehicle Infotainment since our first car radio ICs. Our latest designs provide IC solutions for complex infotainment cluster, integrating advanced audio and video features, mirroring smartphones and multimedia devices and running apps, while transmitting data quickly and securely inside and outside the car. Greater processing power, high in-car bandwidth and secure external communication links together with multi-standard radio receivers and world-class audio amplifiers all combine to ensure that you can build infotainment systems for all your markets.

Our extensive infotainment portfolio covers the full application spectrum from high-end integrated platforms (featuring multi-channel digital radio and outstanding full-digital audio amplifiers) to simple, cost-effective entry-level car-radio solutions.

KEY APPLICATIONS



SOLUTIONS

ST's key products and solutions for In-Vehicle Infotainment applications include:

Audio Power Amplifiers	GNSS	Power Management	EOS and ESD Protection	Infotainment & Digital Audio Processors and Secure Processors
Tuners	Bluetooth, USB and Connectivity	Sensors	MEMS Microphones	

HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors

Smart Driving

FIND OUT MORE

www.st.com/in-vehicle-infotainment

Infotainment Module
Terrestrial Tuner
Sound System
Positioning system
Infotainment Head Unit
Digital Clusters

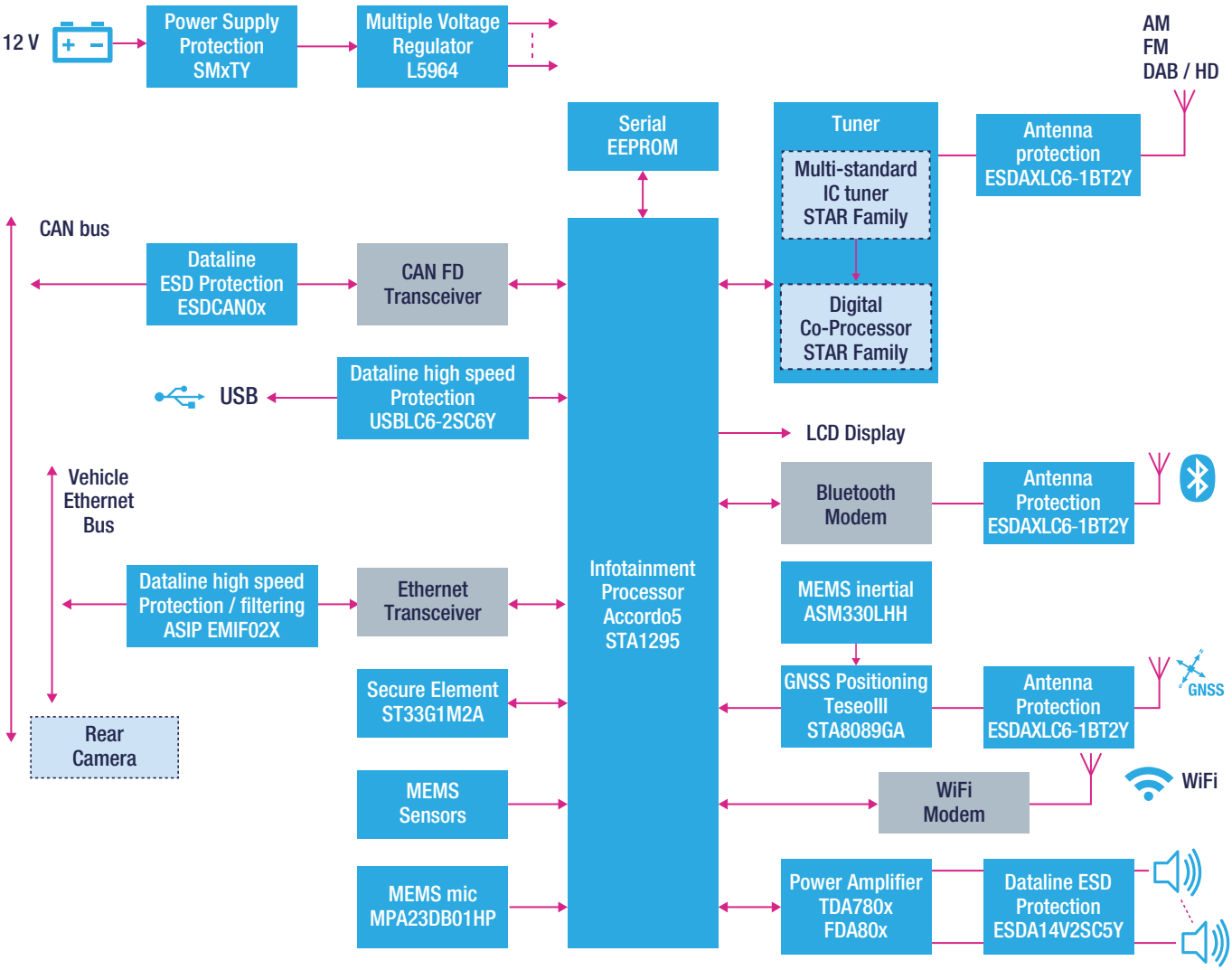
INFOTAINMENT HEAD UNIT

The infotainment module aggregates all the infotainment functions of the vehicle, including tuner reception, media connectivity, audio playback, navigation and human-machine interface.

With the increasing use of smartphones, the demand for user-friendly, hands-free interfaces for text messaging and audio or video phone calls is pushing carmakers to address safety concerns and encouraging them to develop car communication and connectivity solutions that make using these advanced services safe.

ST offers a wide range of products to help develop all of the building blocks in an infotainment module including highly integrated and scalable processors for car radio and audio systems and displays, all standards of analog/digital terrestrial and digital satellite tuner receivers, multi-constellation GNSS positioning devices, sensors and any flavor, Class AB, SB and D, of audio power amplifiers.

Infotainment Head Unit



FIND OUT MORE

www.st.com/infotainment-head-unit

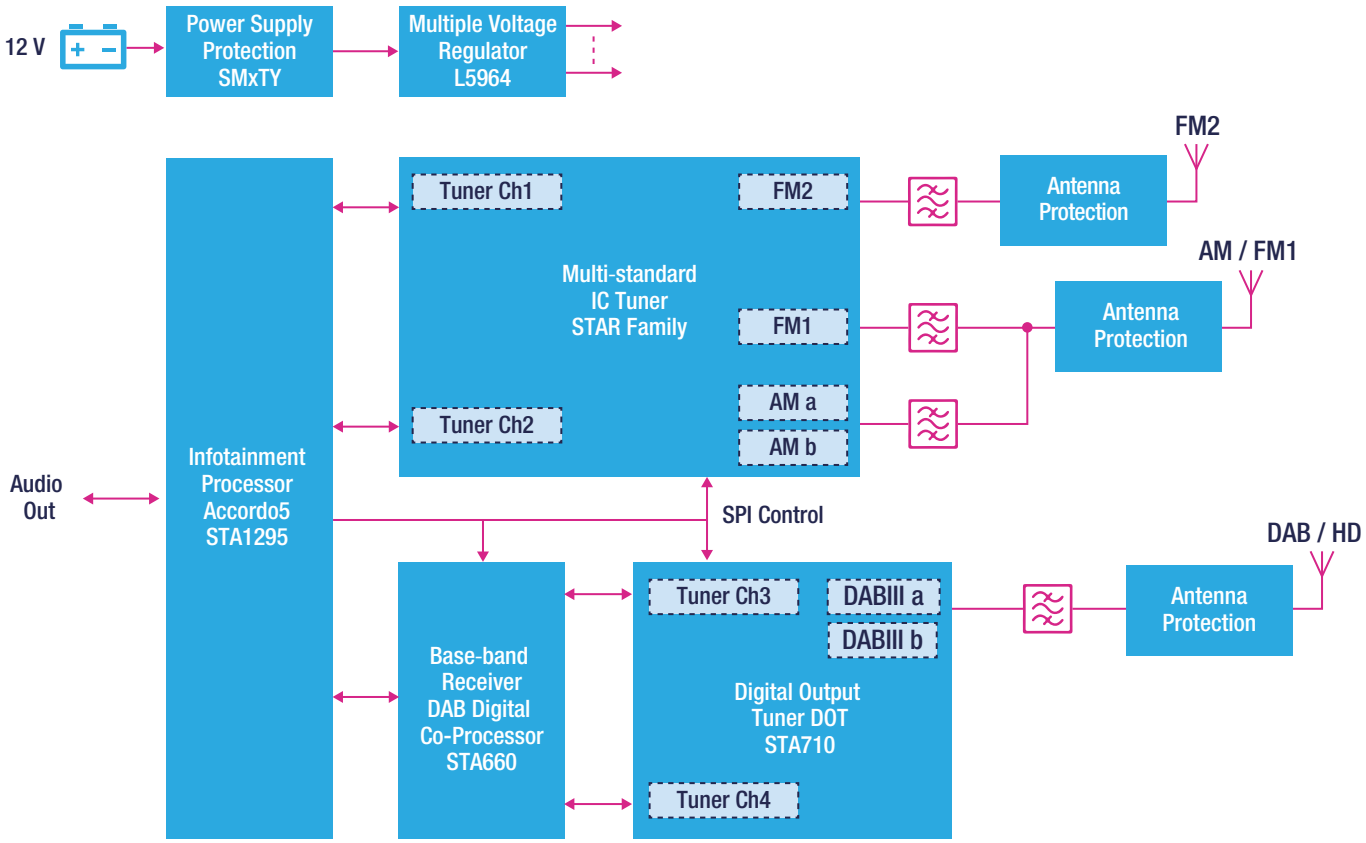
TERRESTRIAL TUNERS

The market demands for tuner platforms are continuously increasing in terms of usage, complexity and scalability. A tuner platform should cover all variants from a simple single AM/FM tuner to a Multi-Standard/Multi–Channel receiver covering AM/FM phase diversity and digital standards such as DAB, DRM or HD Radio™.

All options should be available on a single PCB. Configuration can be managed through PCB mounting options and usable in a classical Head Unit or in a dedicated Tuner Box with additional optional features such as audio.

For terrestrial analog and digital radios ST offers a complete family of pin-to-pin compatible receivers, achieving maximum flexibility and architectural scalability, providing customers optimized solutions from entry up to premium infotainment systems.

Terrestrial Tuner
Architecture Example (FM Phase Diversity+ DAB 1.5)



FIND OUT MORE

www.st.com/terrestrial-tuner

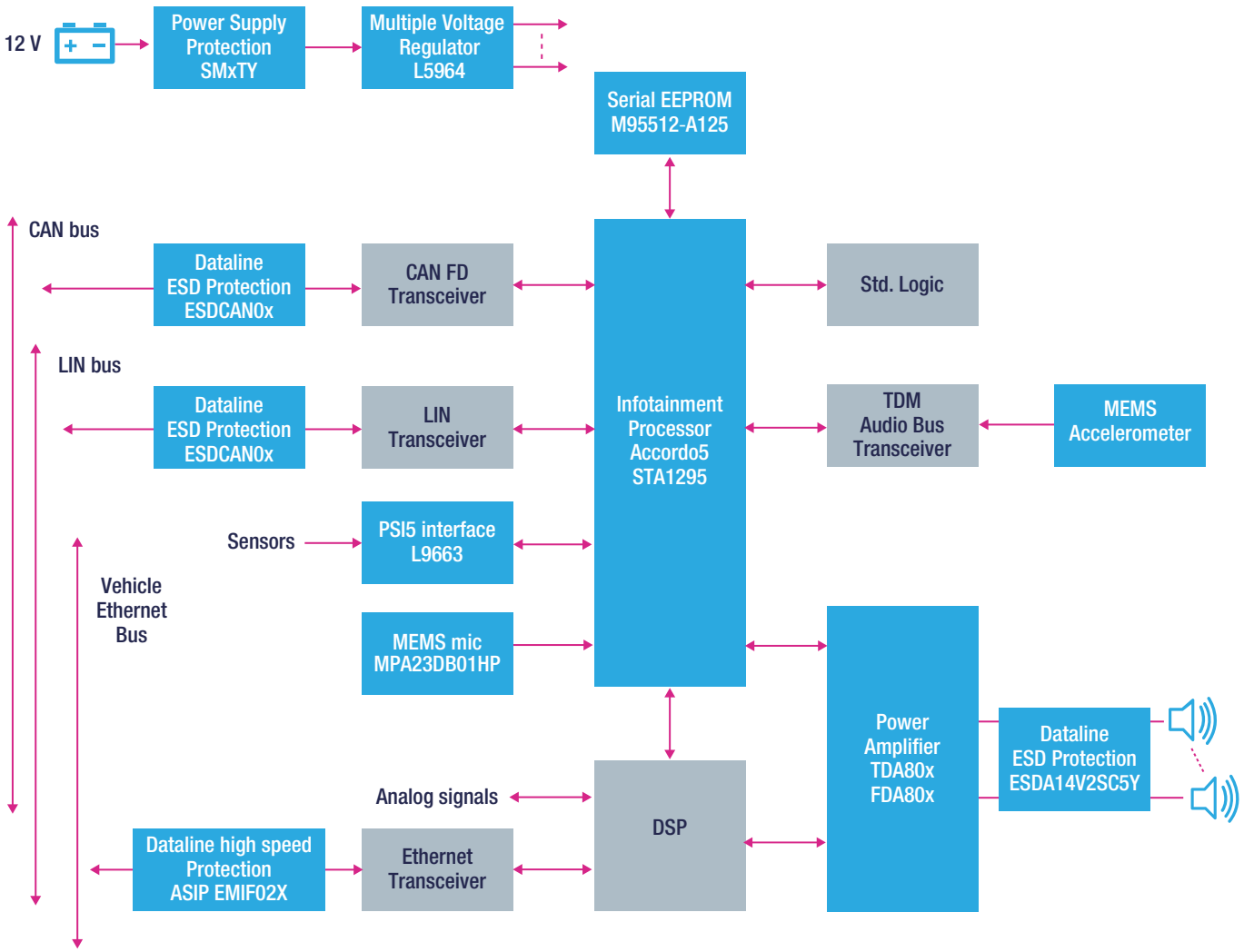
AUTOMOTIVE SOUND SYSTEMS

In-vehicle sound systems can be quite complex with multiple speakers, including sub-woofers, spread around the vehicle's interior to enhance the driving experience with high-end audio, that can satisfy the most demanding music enthusiast.

Traditionally used for playing music and the radio, today's vehicle audio systems include car telematics, diagnostics and in-vehicle services; eCall and hands-free calling; and navigation and telecommunication services.

To help manufacturers to design scalable, high-quality and high-performance sound systems we have an extensive portfolio of automotive-grade audio amplifiers including AB, SB (high-efficiency), SB-I and Class D with analog and digital inputs for any speaker load value, output power and operating voltage.

Automotive Sound System



FIND OUT MORE

www.st.com/automotive-sound-system

Key Technologies

RESEARCH & DEVELOPMENT AND MANUFACTURING

To keep its technology edge, ST maintains a strong commitment to innovation, with approximately 7,400 people working in R&D and product design and spending about 16% of its revenue in R&D. Among the industry's global technology leaders, ST owns and continuously refreshes a substantial patent library (~17,000 patents; ~9,500 patent families and ~500 new patent filings per year).

The Company 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), Silicon Carbide, VIPower, 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.

Development Tools

PRODUCT SELECTORS, SAMPLES, EVALUATION BOARDS

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The on-line smartest selector for Low/high-side switches and H-bridges

STEP 1 — Select **Line Voltage (12 V for cars or 24 V for trucks)**

STEP 2 — Select **Device Topology (LS, HS or H-Bridge)**

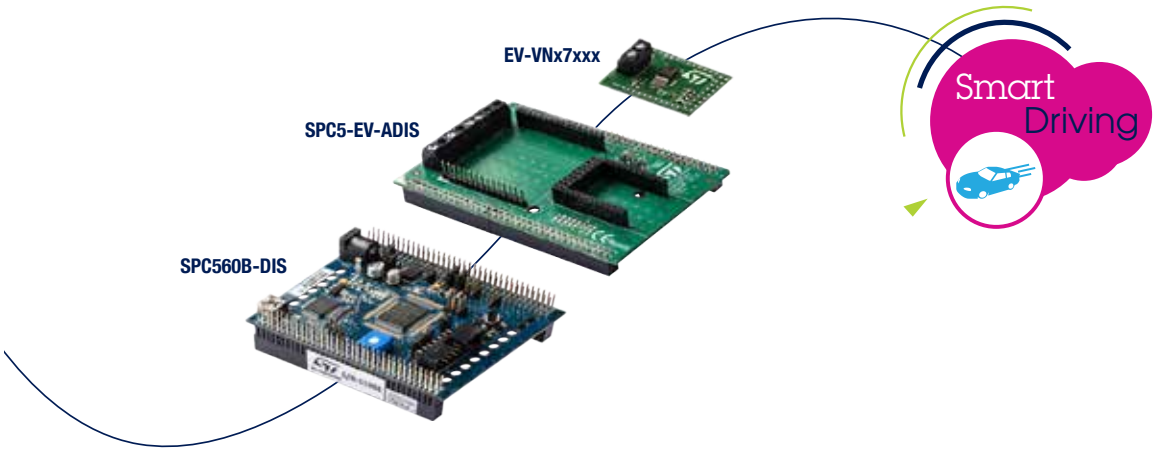
STEP 3 — **Adjust your choice** (channels, load type, etc.)

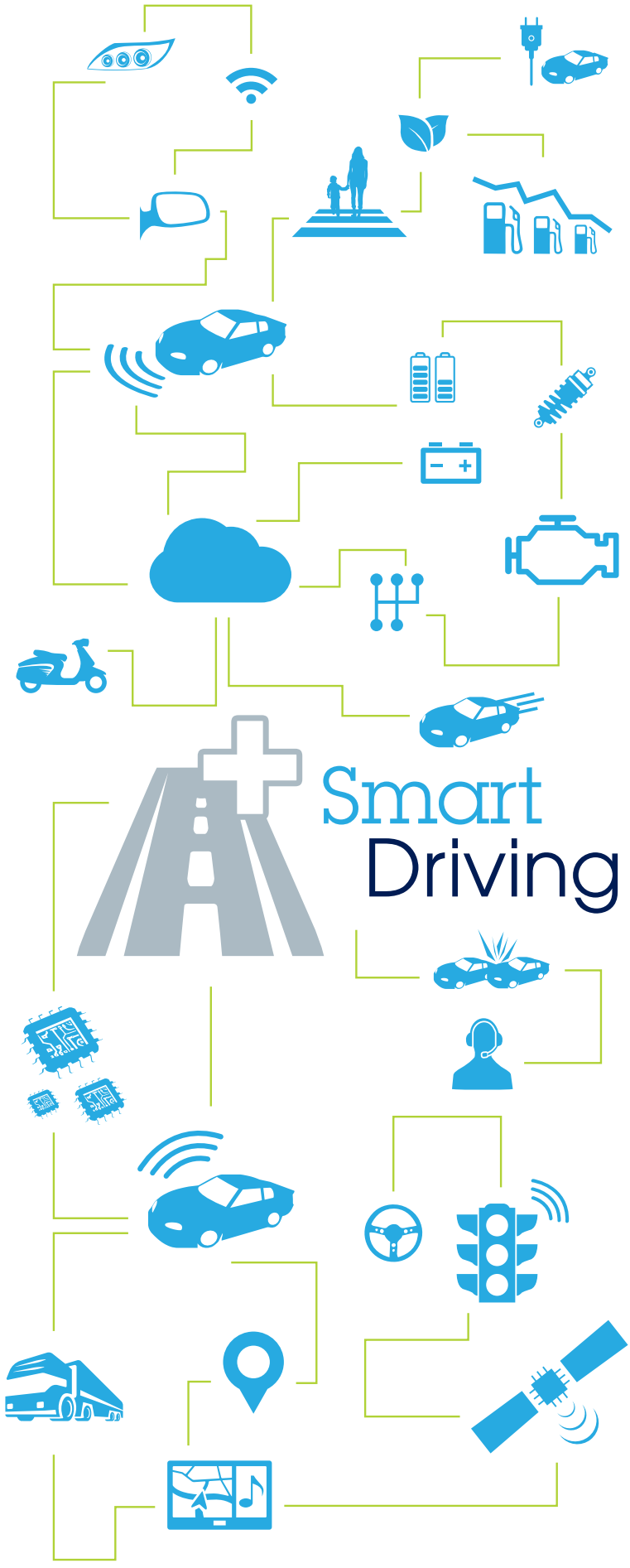
After the PCB selection...

...You can then

- **Get the list of the devices suitable for your application**
- **Click "Compare"** for product parametric comparison

- **Run TwisterSIM,** a thermal/electrical simulator to view detailed thermal information or simply to test specific corner conditions. www.st.com/twistersim




Smart
Driving

life.augmented

Order code: BRAUTOIVI1118

For more information on ST products and solutions, visit www.st.com

life.augmented

Solutions for Smarter Driving
Body and Convenience

Content

Smart Driving

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 Driving products and solutions are making driving safer, greener and more connected through the combination of several of our technologies.

SAFER

Driving is safer thanks to our Advanced Driver Assistance Systems (ADAS) products – 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 units engine management systems, high-efficiency smart power electronics at the heart of all automotive sub-systems and Silicon Carbide devices for hybrid and electric vehicle applications.

MORE CONNECTED

And vehicles are more connected using our infotainment-system and telematics processors and sensors, as well as our radio tuners and amplifiers, positioning technologies, and secure car-to-car and car-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

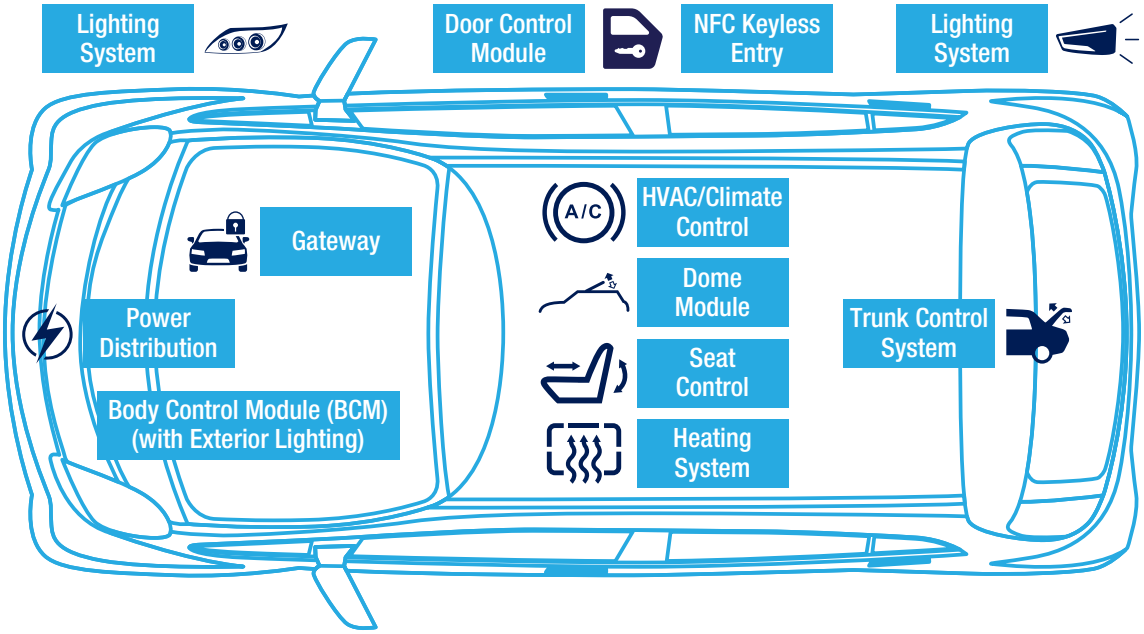
Car body and convenience applications are evolving to increase the comfort of both drivers and passengers. Vehicle manufacturers need solutions that have the flexibility to cover a wide range of car models and a broad range of options. These solutions need to communicate increasing amounts of data to 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 have 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, whether with LIN, CAN or Ethernet.

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 and ESD Protection	32-bit Automotive Microcontrollers
	NFC	Connectivity	Power Diode, MOSFET & IGBT	Dedicated Door Module ICs	

HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors

Smart Driving

FIND OUT MORE

www.st.com/body-and-convenience

Body Control Module
Consumer Device Charging
Dome Module
Door Lock
Door Module
Exterior Lighting
Gateway
Head-up Display
Heating System
HVAC / Climate Control
LED Lighting System
NFC Keyless entry
Power Distribution
Seat Control

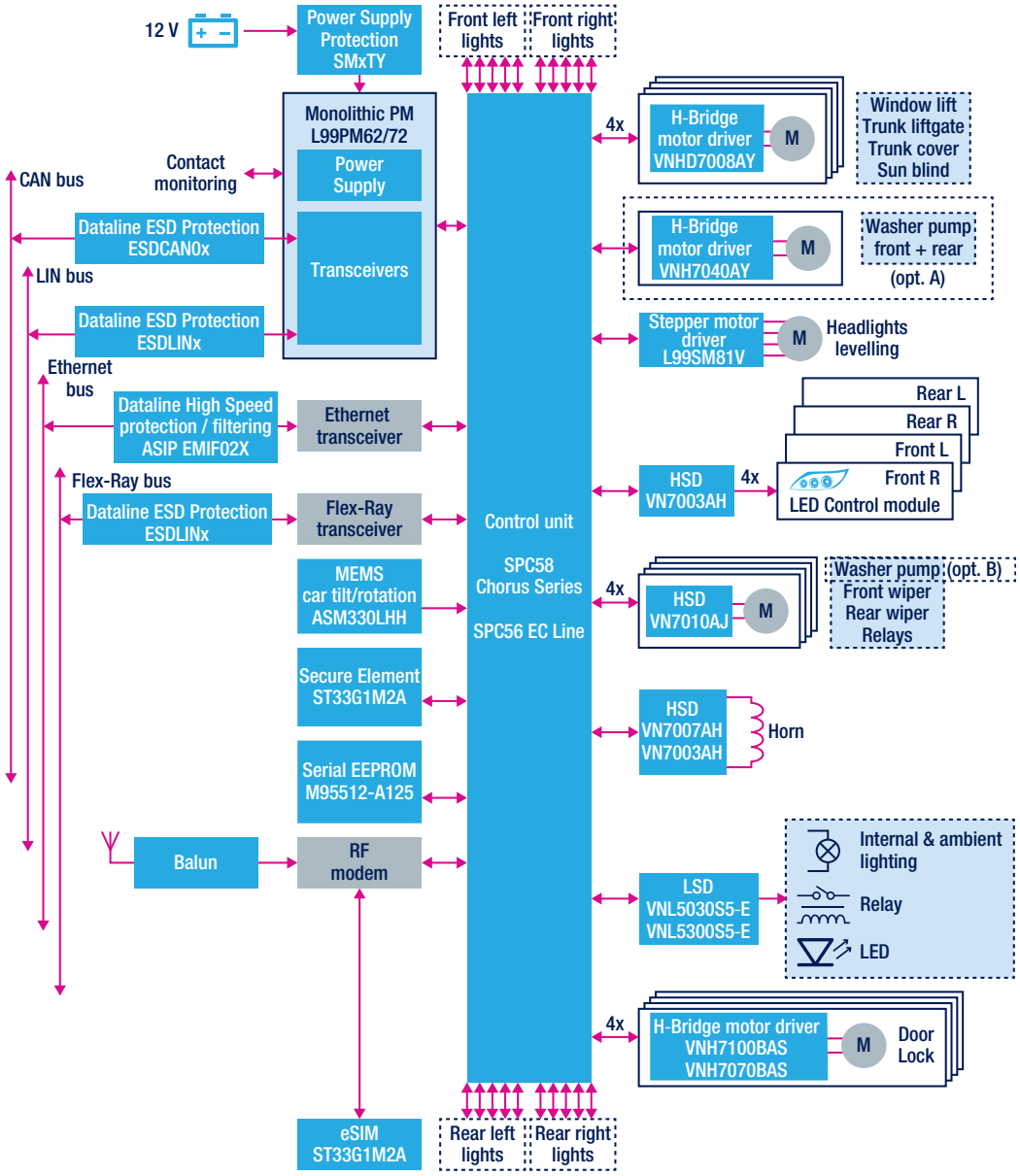
BODY CONTROL MODULE (BCM)

Body control modules are adding 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, LED lamps and 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, 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.

BCM core section



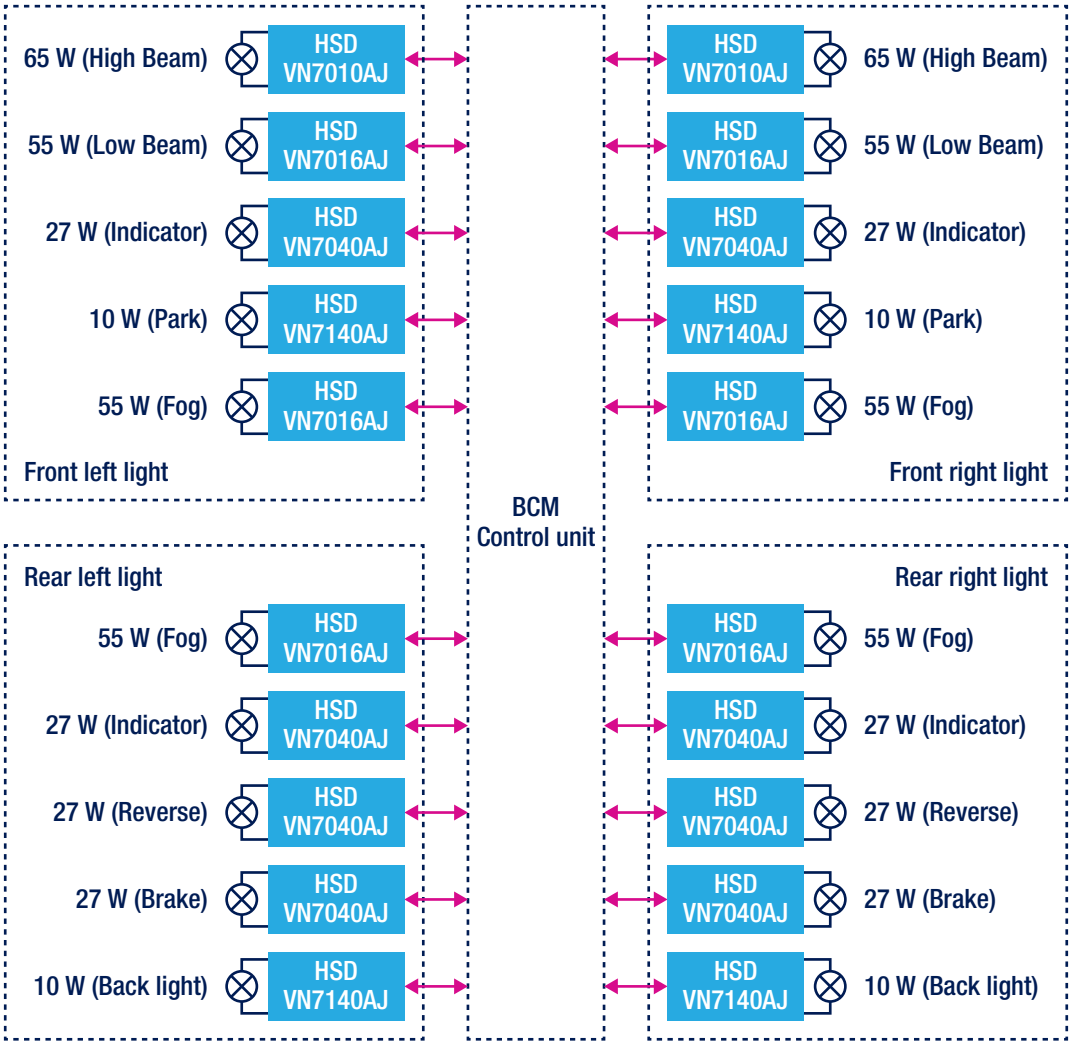
FIND OUT MORE

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.

Car Exterior Lighting



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www.st.com/car-exterior-lighting

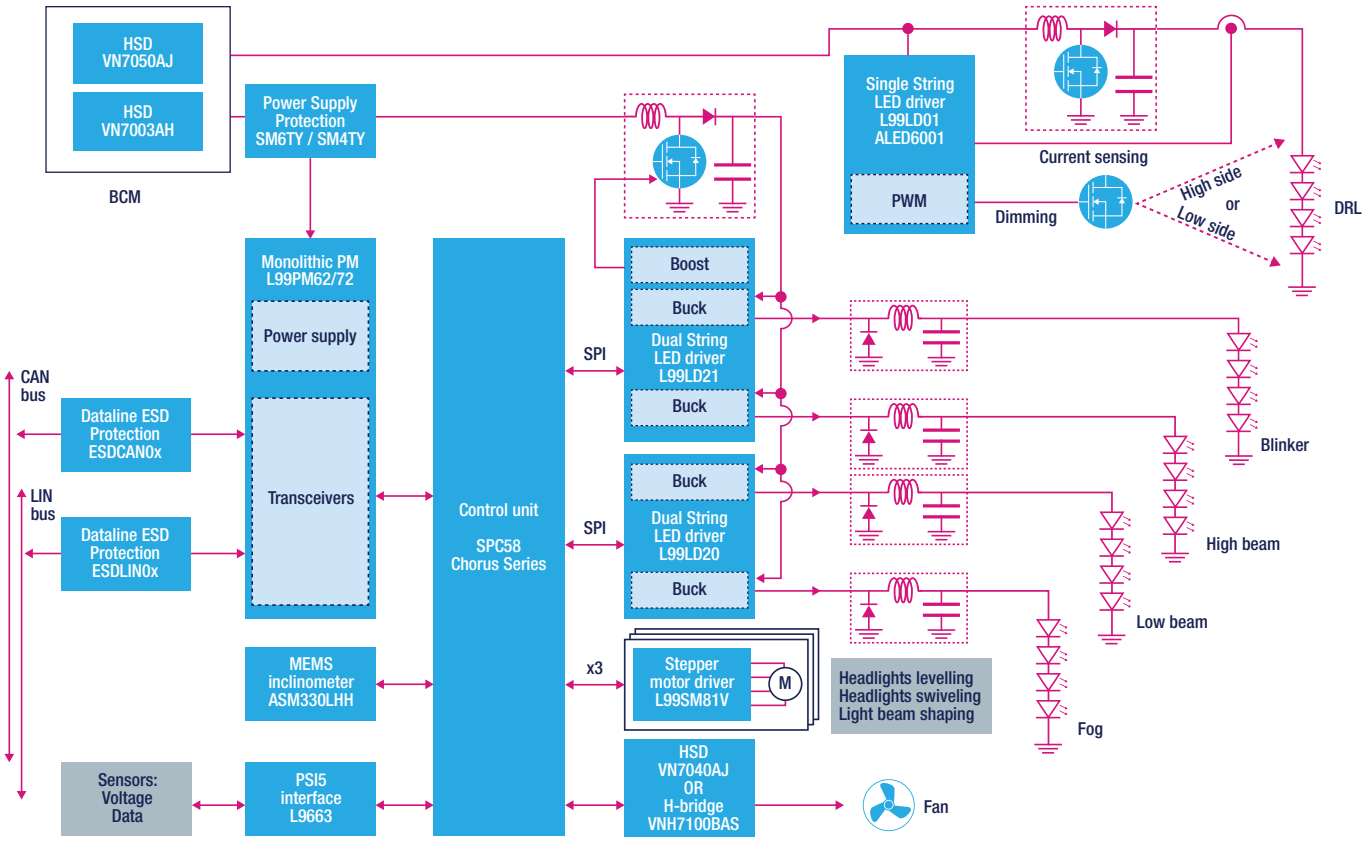
LED LIGHTING SYSTEM

In all automotive lighting systems, LEDs are replacing existing technologies due to their inherent power efficiency, increased lifetime (with innate 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.

LED Lighting System



FIND OUT MORE

www.st.com/led-front-light

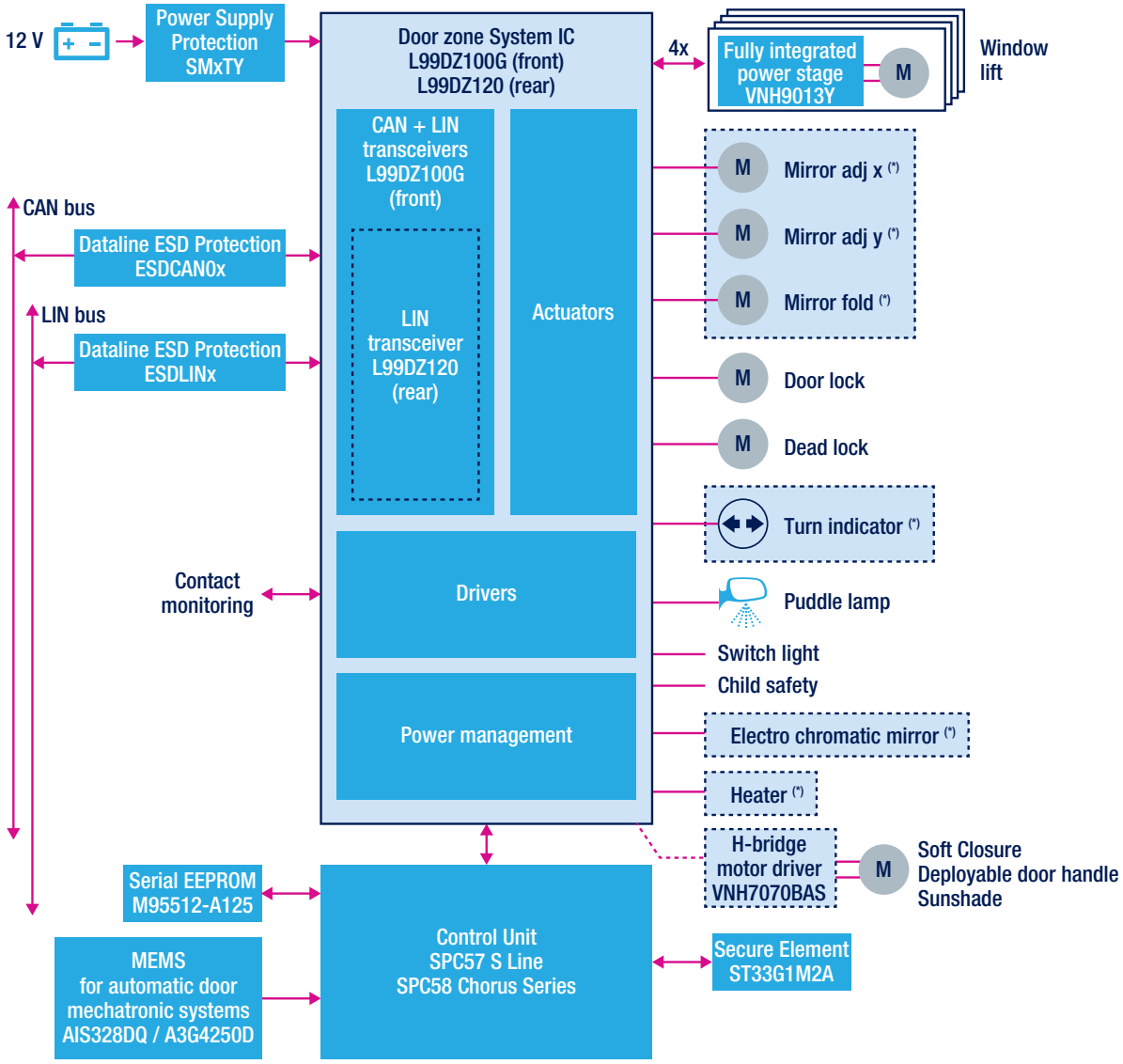
DOOR CONTROL MODULE

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 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



Legend:

(*) Only in front module

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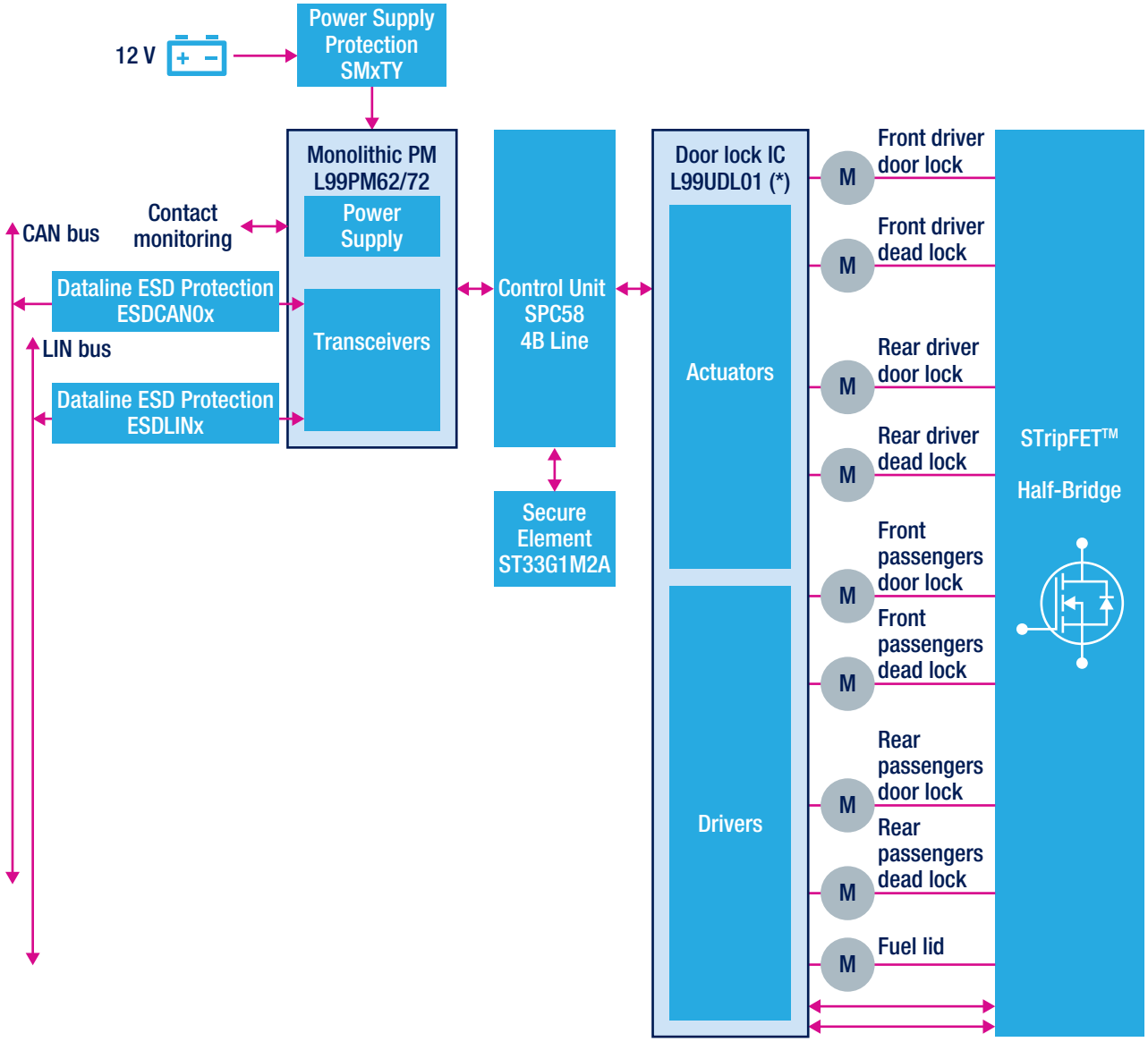
www.st.com/door-control-module

DOOR LOCK

Centralized architecture

Most vehicles today employ a BCM module or a dedicated ECU to control door locking and unlocking. Originally employed in luxury cars, electronic control of vehicle access has become almost universal. The systems have now evolved adding trunk and fuel lid locking to control of the four doors.

ST offers an innovative integrated door lock IC 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 trunk, fuel lids or EV plug lids. Furthermore, the addition of a secure MCU element guarantees a high-level of security against malicious intrusion attempts.



Legend:

(*) Contact ST sales office

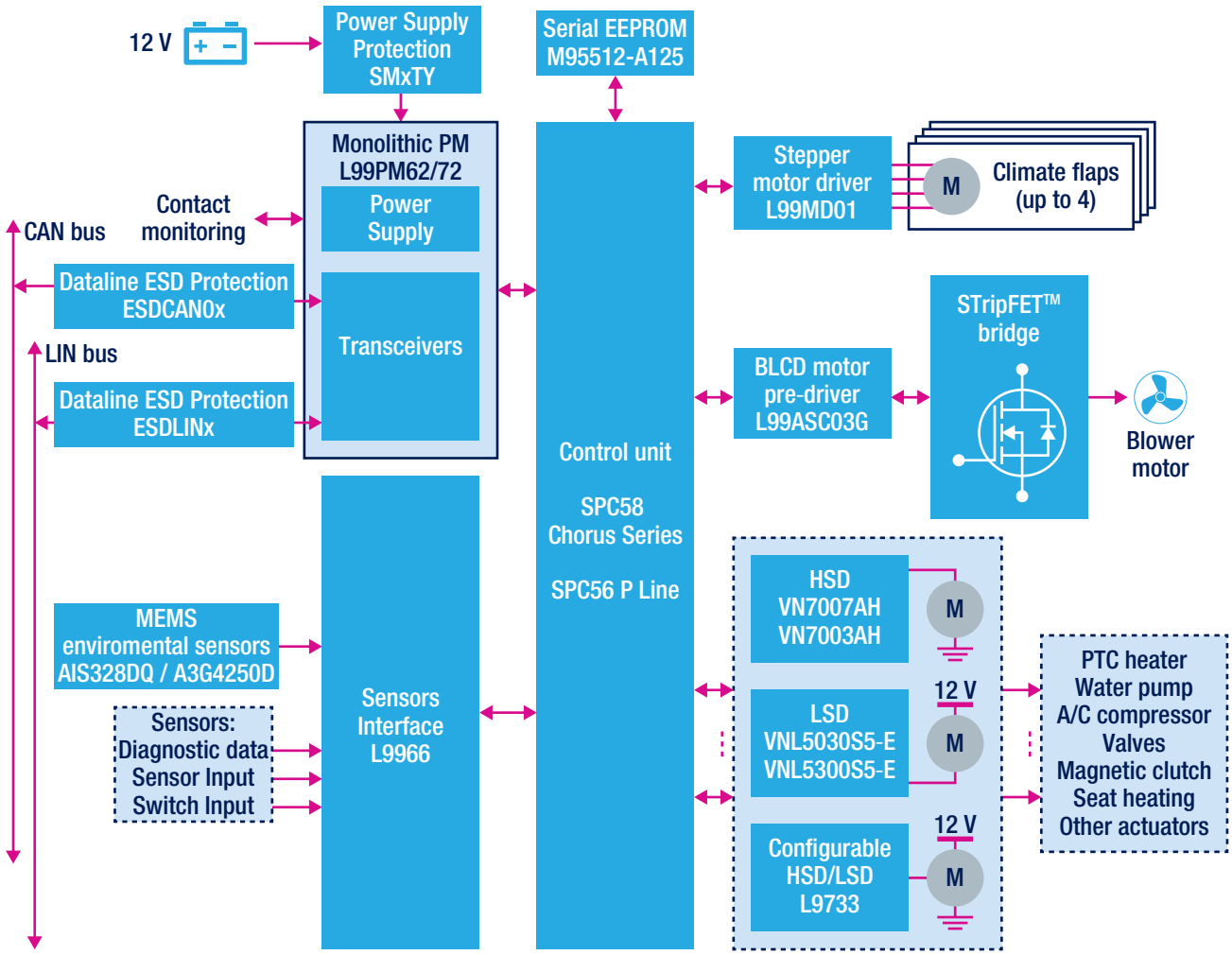
FIND OUT MORE

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 hardware and software 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.

HVAC and Climate Control



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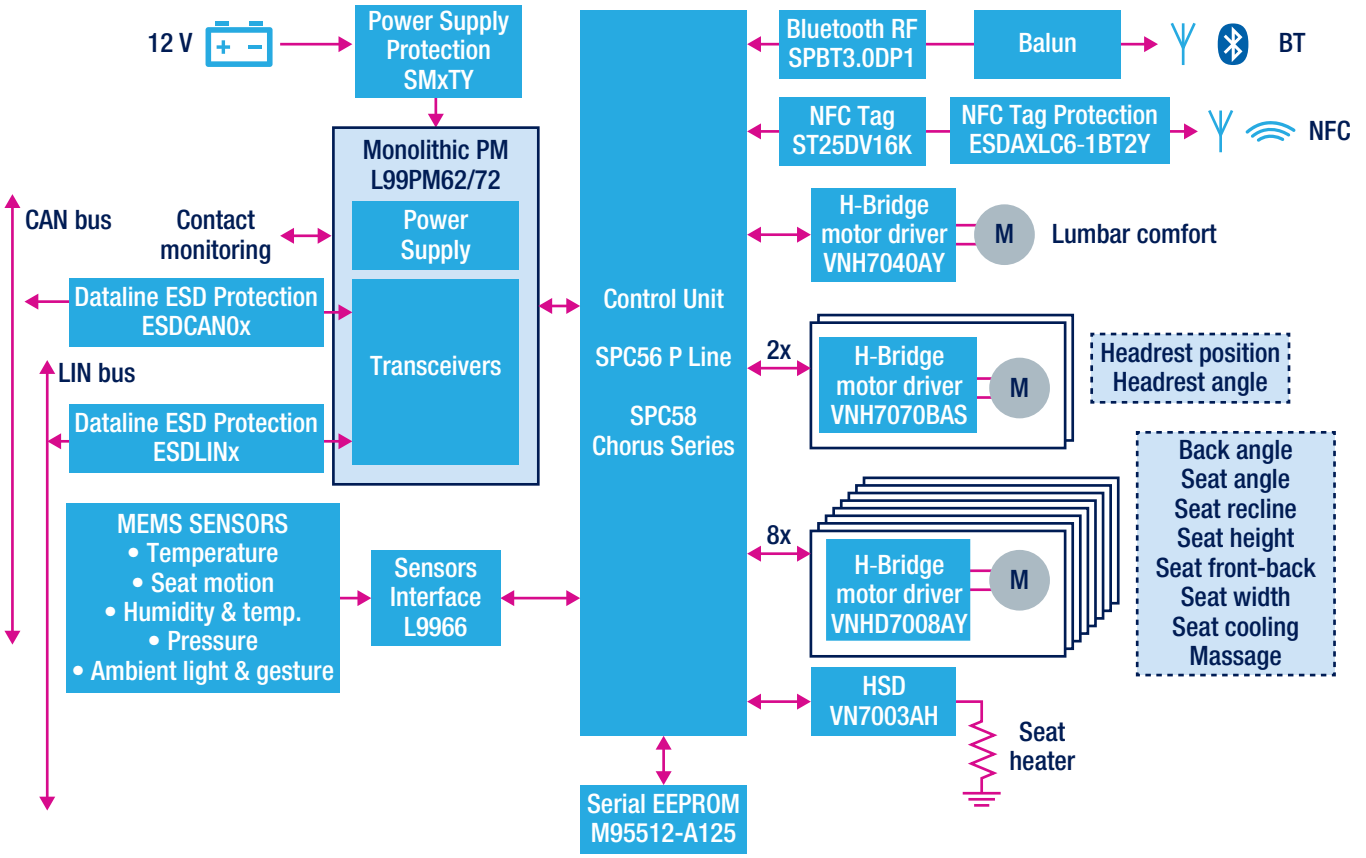
www.st.com/hvac-and-climate-control

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 M0-7 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: Our System Basis Chip (SBC) products, supply power, provide communication transceivers 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.

Seat Control Modules



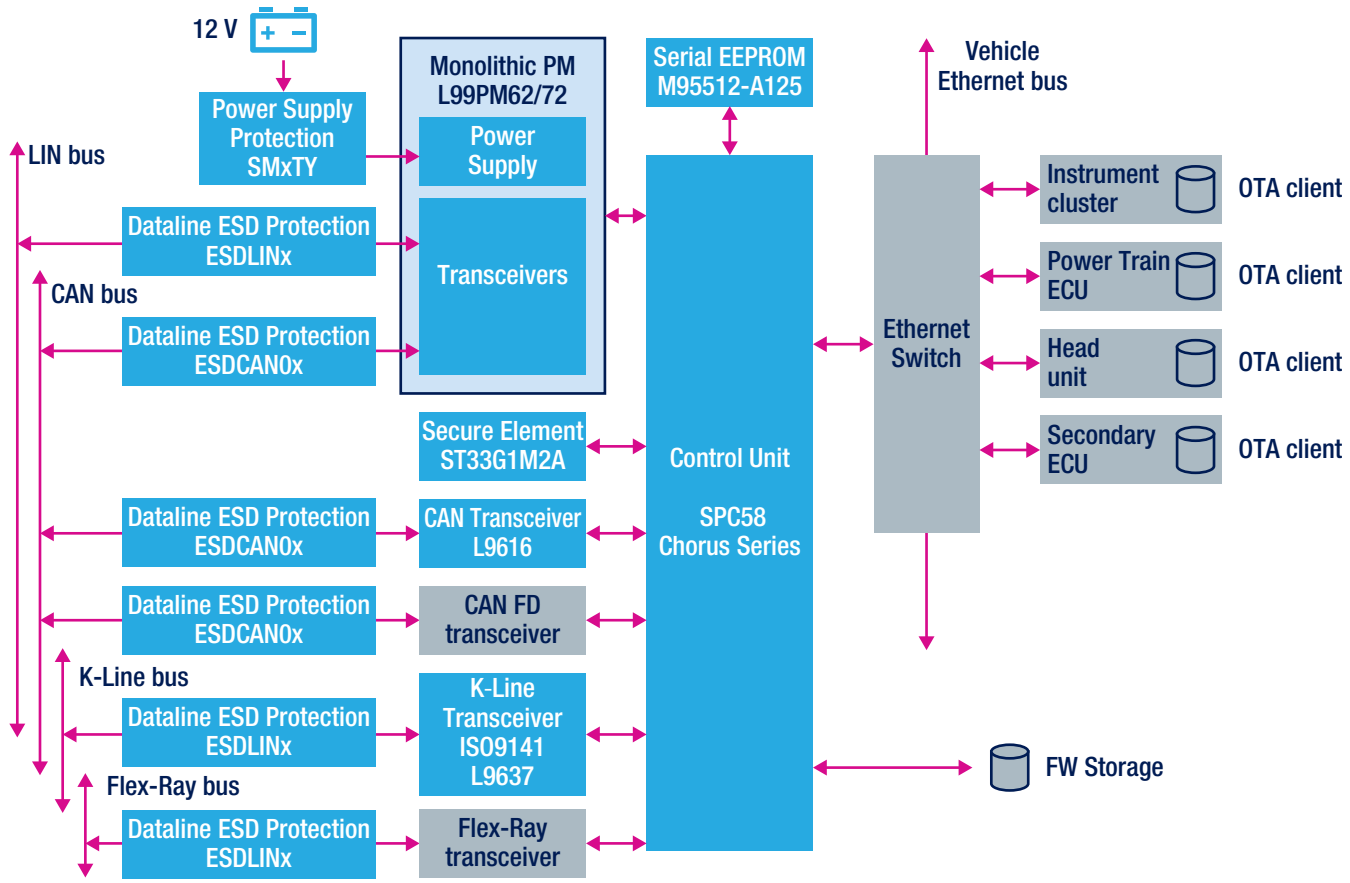
FIND OUT MORE

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, 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.

Automotive Gateway



FIND OUT MORE

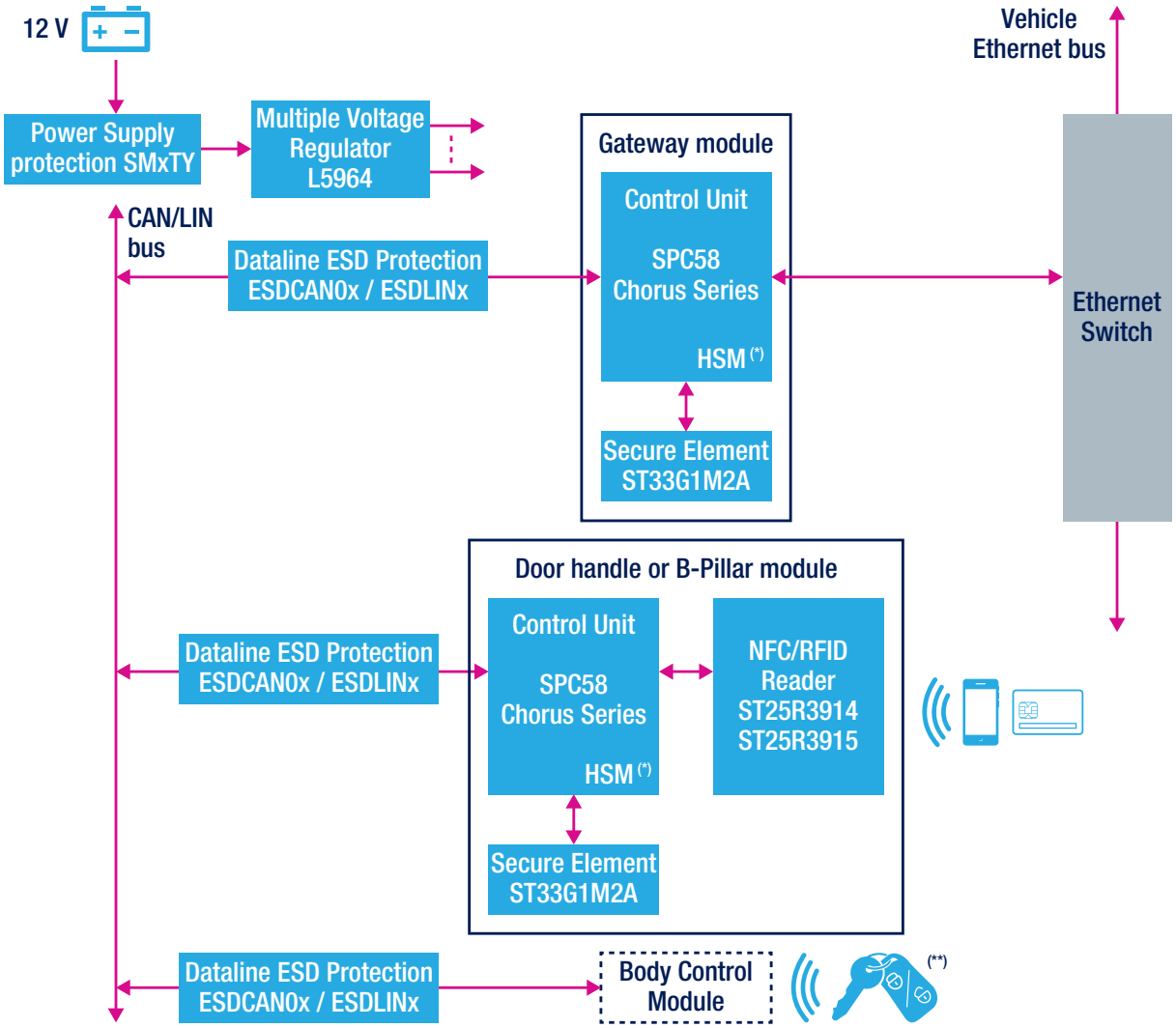
www.st.com/automotive-gateway

NFC KEYLESS ENTRY

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 renters' 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.

NFC Keyless Entry



Legend:

(*) Hardware Security Module
(**) Accelerometer AIS2DW12 available for PKE keys

FIND OUT MORE

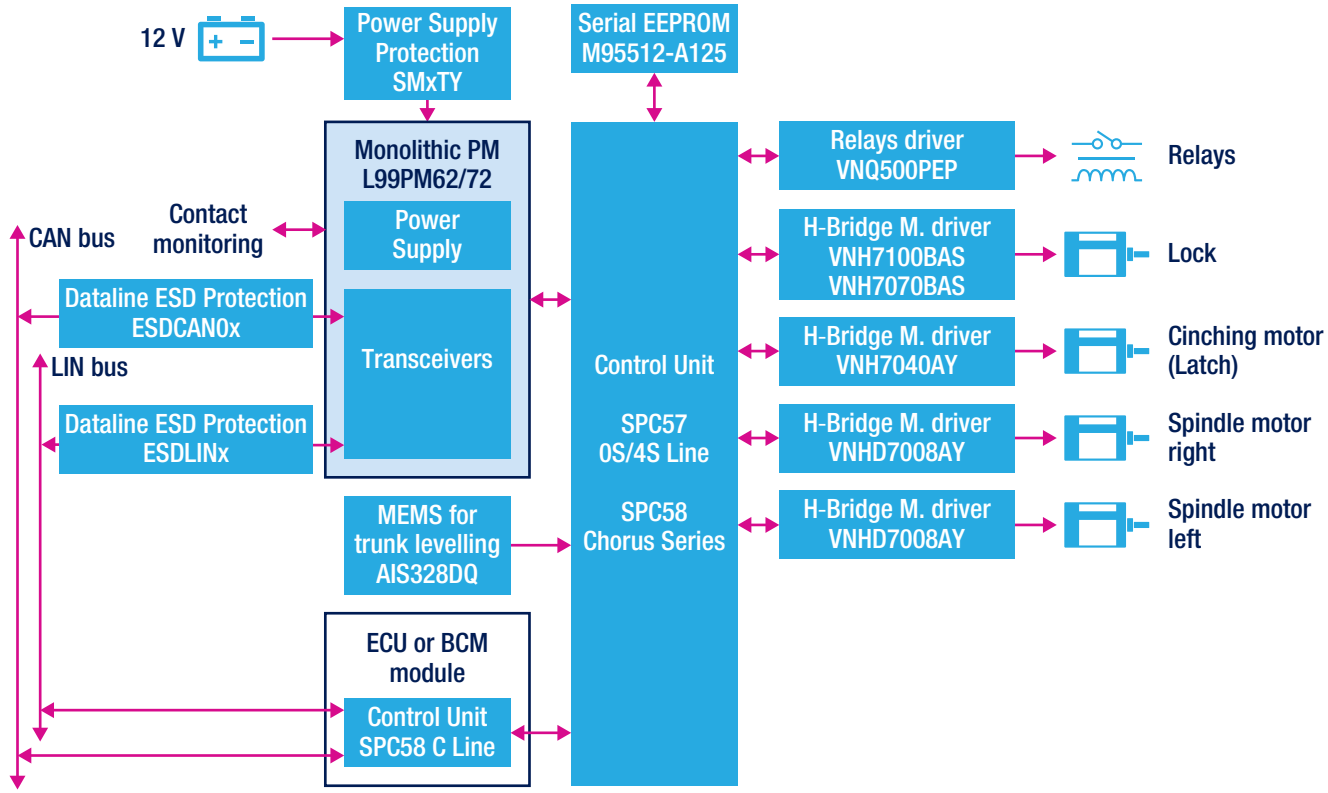
www.st.com/nfc-keyless-entry

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 Discovery Ecosystem allows rapid development combining versatile MCUs e.g. the SPC56 B line with a range of VIPower™ easyboards (from 8 to 100 mΩ) that enable the evaluation of a range of motor driver solutions for car body applications including trunk control systems.

Trunk Control System



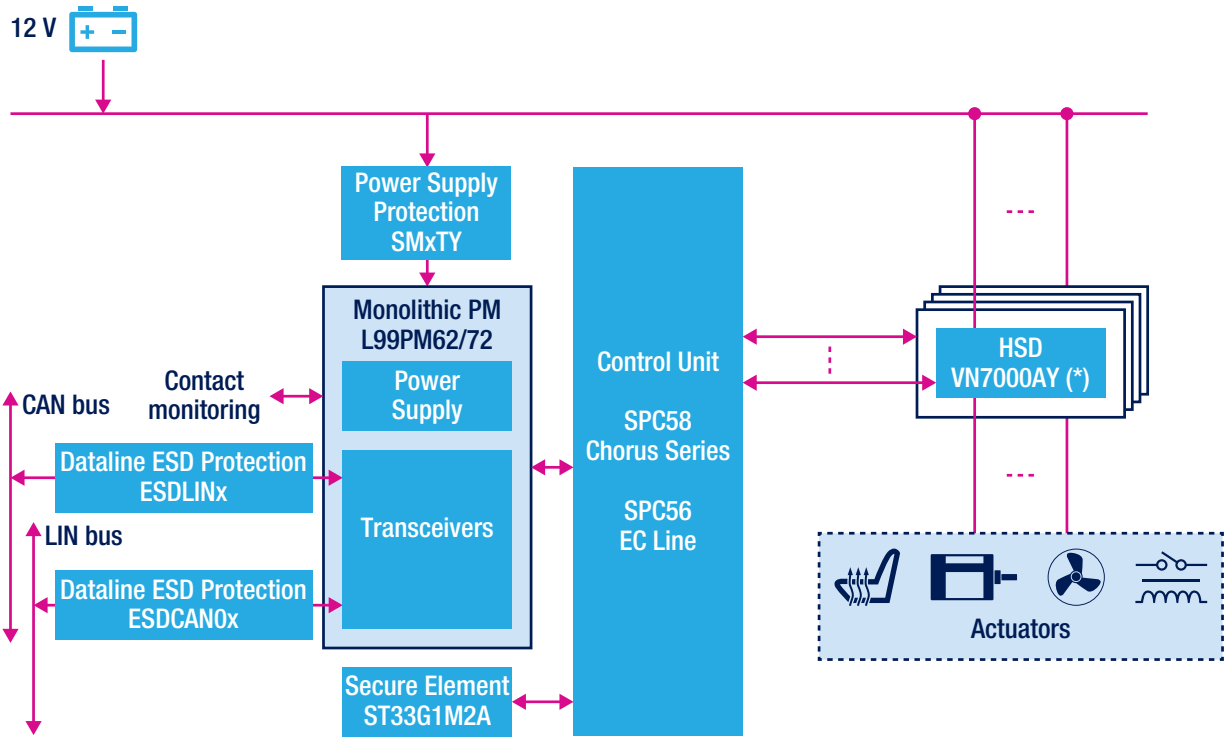
FIND OUT MORE

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 ST Intelligent Power Switches based on our proprietary VIPower™ technology. These, combined with an automotive grade 32-bit SPC58 MCU 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.

Power Distribution



Legend:

(*) Contact ST sales office

FIND OUT MORE

www.st.com/power-distribution

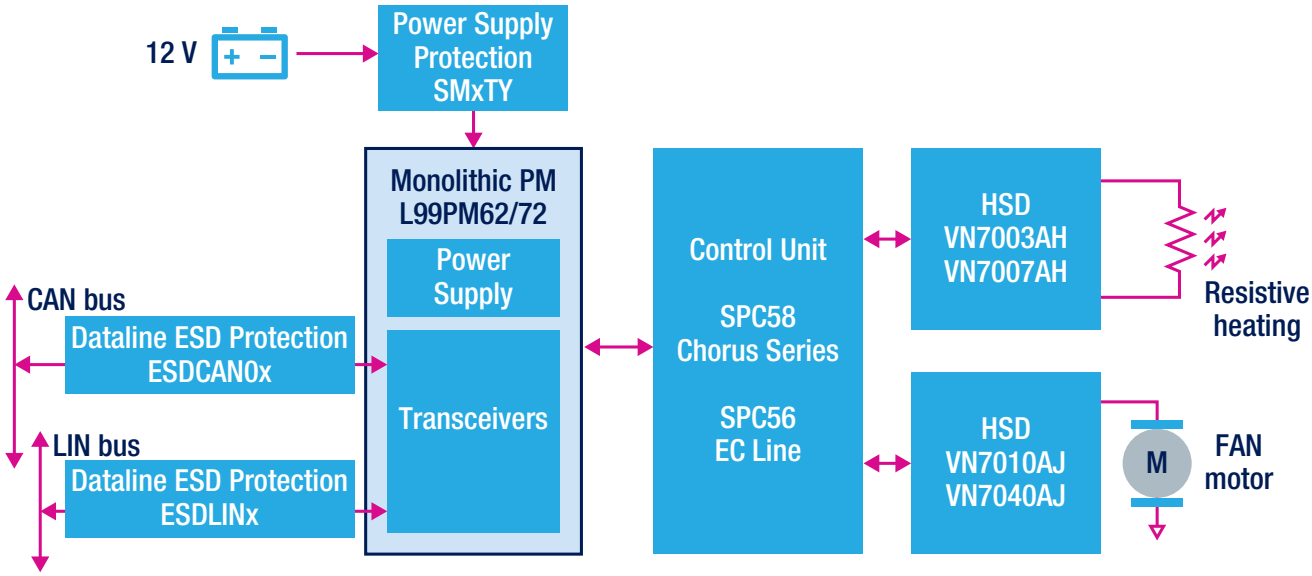
HEATING SYSTEM

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

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 VIPower™ Zero series application-specific power ICs and SPC5 32-bit microcontrollers as well as protection devices to enable the development of scalable car heating systems.

Heating System



FIND OUT MORE

www.st.com/heating-system

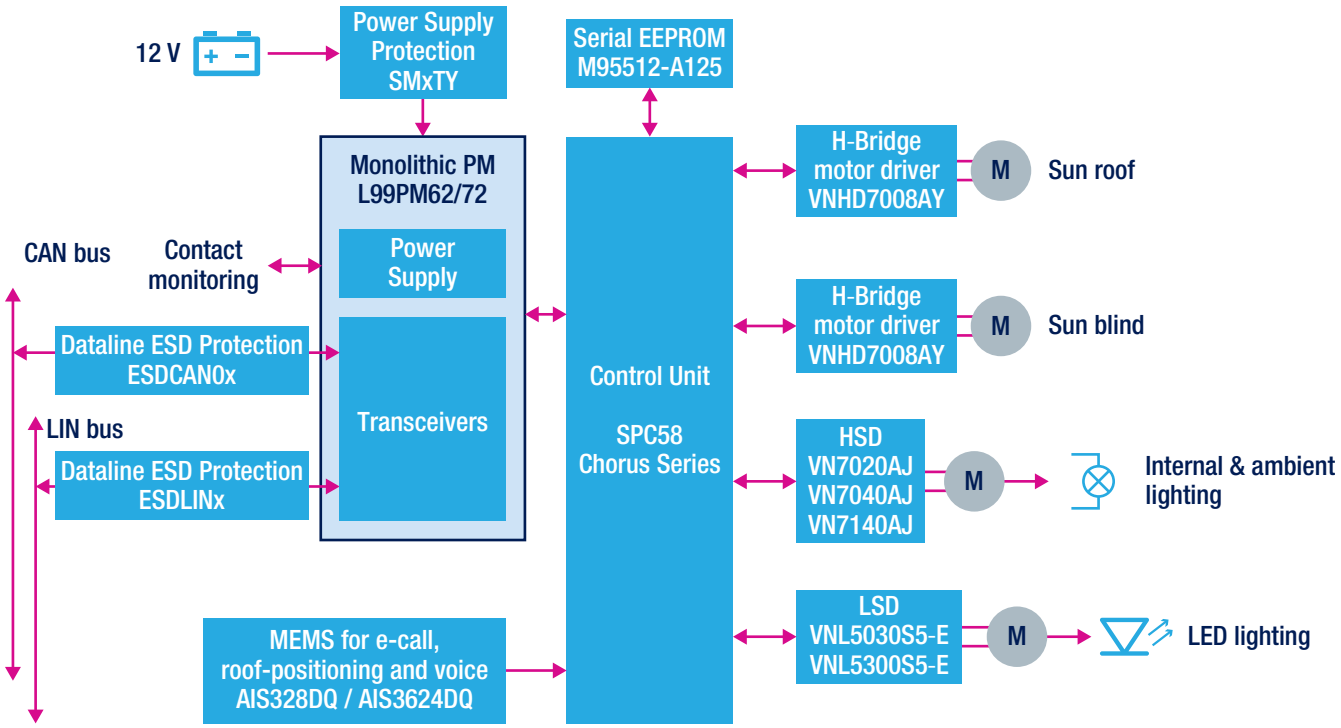
DOME MODULE

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 feature include

- Ceiling lighting control for LED light sources
- Sunroof control and security
- Microphones for Voice control / 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-sided drivers and motor control functions with fully integrated H-bridges. Protection and networking are also covered with our dataline ESD protection and transceiver ICs.

Dome Module



FIND OUT MORE

www.st.com/dome

Key Technologies

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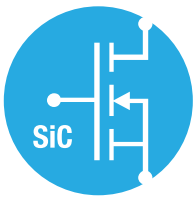
KEY TECHNOLOGIES FOR AUTOMOTIVE PRODUCTS

Silicon Carbide

Silicon Carbide (SiC) is a wide bandgap material, with many advantages compared to silicon in the field of power electronics. Operating temperatures are higher, heat dissipation is improved and switching and conduction losses are lower making it an ideal technology for vehicle electrification. Silicon Carbide based traction inverters can increase electric vehicle range and SiC based chargers reduce the charge time.

ST has been working with Silicon Carbide since 1996. In 2009 ST started to produce its first SiC MOSFETs and since then we have added 1200 V versions of both SiC MOSFETs and power Schottky diodes to complement the original 650 V versions.

ST produces the automotive-grade SiC power devices, in a dedicated 6" front-end wafer fab, that are becoming the key enabler in the automotive industry for vehicle electrification.



VIPower™

VIPower™ is a technology developed by ST and in production since 1991. Vertical Intelligent Power technologies provide 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-Mixed design.

VIPower™ technology is the perfect choice for the control of automotive exterior and interior lighting, DC motors for seat adjustment, door locks and window lifts, resistive heaters and any kind of power load that needs control and sensing as well as power. VIPower™ products are replacing a host of electro-mechanical solutions, and providing lower power, lower chip count and lower pin-count solutions.

VIPower™ technology will play 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 ECUs microcontroller.

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.

BCD technology is used widely in the automotive industry and products are found in active suspension, braking, transmission, airbag, car audio and notably engine management and charging applications. A key engine management application is for fully integrated System-on-Chip solutions for CO_2 reducing Gasoline Direct Injection (GDI) systems. For EV charging BCD is ideal for battery management systems (BMS).

Development Tools

PRODUCT SELECTORS, SAMPLES, EVALUATION BOARDS

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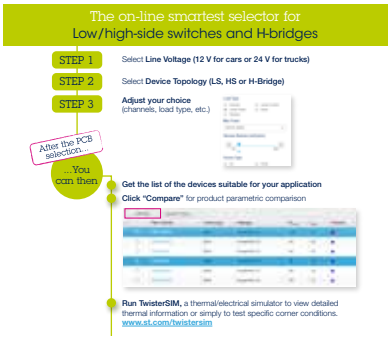
VIPower™ Smart Selector

VIPower's Smart Selector is designed to help and assist users to choose the best VIPower™ high/low-side switch or H-bridge device for their Automotive application.
All you need to do is select a few parameters related to your specific application, and the selector provides the relevant device. Parameters include nominal voltage (12 V for automotive cars or 24 V for trucks), a topology (high-side, low-side or H-bridge), the number of channels and type of load to drive (bulbs, motors, etc.). The selection can be further refined by setting source type (DC or PWM), temperature and PCB type.



FIND OUT MORE

www.st.com/vipower-smartselector

Easyboards

The Easyboard concept was created to give customers the chance to evaluate products without committing to the expense, time and resources typically needed to design a custom circuit board. Easyboards are simple and low-cost evaluation tools that connect a VIPower™ product to a load. This allows a straightforward evaluation of the device and of all the application functionalities, including the auto-protection capability for hazardous conditions. Each evaluation board includes a VIPower™ device soldered onto a small 2-layers PCB with heavy copper and thermal vias, to support maximum device current and customer-configured thermal relief strategies.
Easyboards come with the following part numbers:

- EV-VNx7xxx: VIPower™ M0-7 High Side Switches single, dual and quad channels for 12 V battery lines
- EV-VNx5Txxx: High Side Switches for 24V systems
- EV-VNH7xxx: Motor Control solutions

FIND OUT MORE

www.st.com/automotive-evalboards

SPC5 AUTOMOTIVE MCU EVALUATION TOOLS: EASIER EVALUATION AND FASTER DEVELOPMENT

A complete range of hardware evaluation and emulation tools supports the SPC5 family of automotive microcontrollers. Discovery and Premium development boards are available to support your development from preliminary evaluation through to advanced solution development.

ST Discovery boards, available for each product line enable a quick and easy way to evaluate the microcontroller's main features. The expansion connector makes it easy to plug in application and extension modules for rapid prototyping.

ST Premium boards, available for all lines and packages provide user access to the device's complete feature set and functionalities for advanced development. The SPC5 motherboards, used in combination with adapters, enable full access to all of the MCU's signals and peripherals (such as CAN, SPI, LIN, FlexRAY and Ethernet).

The offer is complemented by a series of emulation solutions for high-speed tracing, monitoring and bypassing.

A full range of state-of-the-art tools and software from major third parties is also available for the SPC5 family of automotive microcontrollers.

FIND OUT MORE

www.st.com/auto-sp5-mcu-evaltools

Dynamic Electro-Thermal simulator for devices in VIPower™ technology

TwisterSIM is a unique Electro-Thermal simulator that helps shorten the design solution cycle by enabling, in a few clicks, complex engineering evaluations with accurate simulations like load-compatibility, wiring harness optimization, fault condition impact analysis, diagnostic behavior analysis and dynamic thermal performance.

A built-in Interactive selector provides a short list of suitable devices based on first level system requirements. It assists you in detailing your actual system configuration with layout, load and driving profile customization to build an accurate model of the final application.

TwisterSIM supports a large selection of Low/High-side driver/switches and H-bridges for Motor Control.

FIND OUT MORE

www.st.com/twistersim

VIPower-FINDER

VIPower™ smart product finder application for Android and iOS

VIPower-FINDER is the application available for Android™ and iOS™ that allows you to explore the ST VIPower™ product portfolio using portable devices. You can easily define the device that best fits your application using the Smart or the parametric search engine. You can also find your product thanks to the efficient part number search engine.

Key Features
- Smart, parametric or part number search capability for product
- Technical datasheet downloading and off-line consulting
- Ability to share technical documentation via social media or via email
- Available on Android™ and iOS™ app stores

FIND OUT MORE

www.st.com/vipower-finder

life.augmented

life.augmented

Solutions for Smarter Driving
Powertrain for ICE

Content

Smart Driving

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 Driving products and solutions are making driving safer, greener and more connected through the combination of several of our technologies.

SAFER

Driving is safer thanks to our Advanced Driver Assistance Systems (ADAS) products – 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 units engine management systems, high-efficiency smart power electronics at the heart of all automotive sub-systems and Silicon Carbide devices for hybrid and electric vehicle applications.

MORE CONNECTED

And vehicles are more connected using our infotainment-system and telematics processors and sensors, as well as our radio tuners and amplifiers, positioning technologies, and secure car-to-car and car-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.

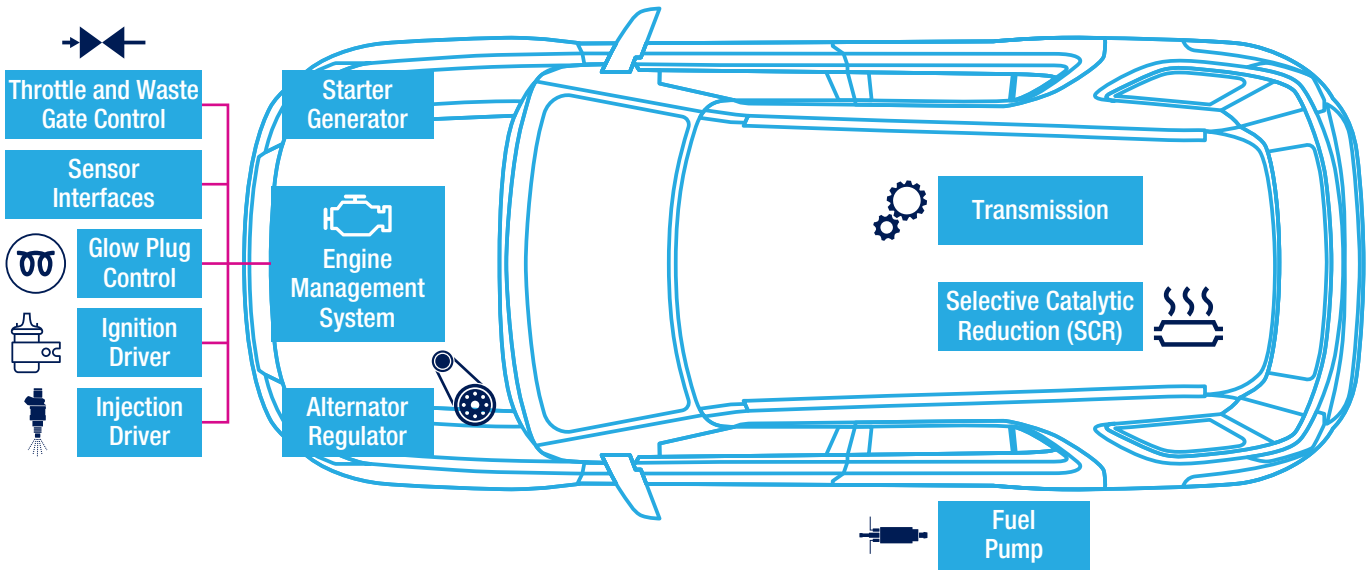
Powertrain for ICE

Reducing CO_2 and particle emissions, while increasing engine performance and improving the overall driving experience requires ever more sophisticated semiconductor-based solutions. A combination of increased processing power, built-in security and safety features, and innovative power technologies are revolutionizing Internal Combustion Engine (ICE) powertrain applications.

ST provides silicon solutions for a broad range of Engine Management Systems (EMS), from motorcycles to multi-cylinder gasoline direct injection and common-rail diesel engines, as well as for transmission control and actuation. Our broad in-house technology portfolio enables a complete range of solutions, from cost-effective highly integrated systems to solutions meeting the most advanced high-performance application requirements.

Our product portfolio addresses your entire system solution, providing 32-bit automotive microcontrollers, standard low-side, high-side and bridge smart power devices for driving solenoids, DC motors and stepper motors. Dedicated ICs for actuator driving, charging and power management, together with one of the industry's broadest ranges of Power MOSFETs and IGBTs complete the ICE powertrain offer.

KEY APPLICATIONS



SOLUTIONS

ST's key products and solutions for Powertrain for Internal Combustion Engines applications include:

VIPower and BCD Actuators and Motor Control

Transceivers

Power Management

EOS and ESD Protection

32-bit Automotive Microcontrollers

Power Diode, MOSFET & IGBT

Signal Conditioning

Sensor Interfaces

HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors

Smart Driving

FIND OUT MORE

www.st.com/powertrain-for-ice

Engine Management Systems
24 V Engine Management
Gasoline Direct Injection
Gasoline multi-point Injection
Diesel Direct Injection
LPG Engine Control
CNG Engine Control

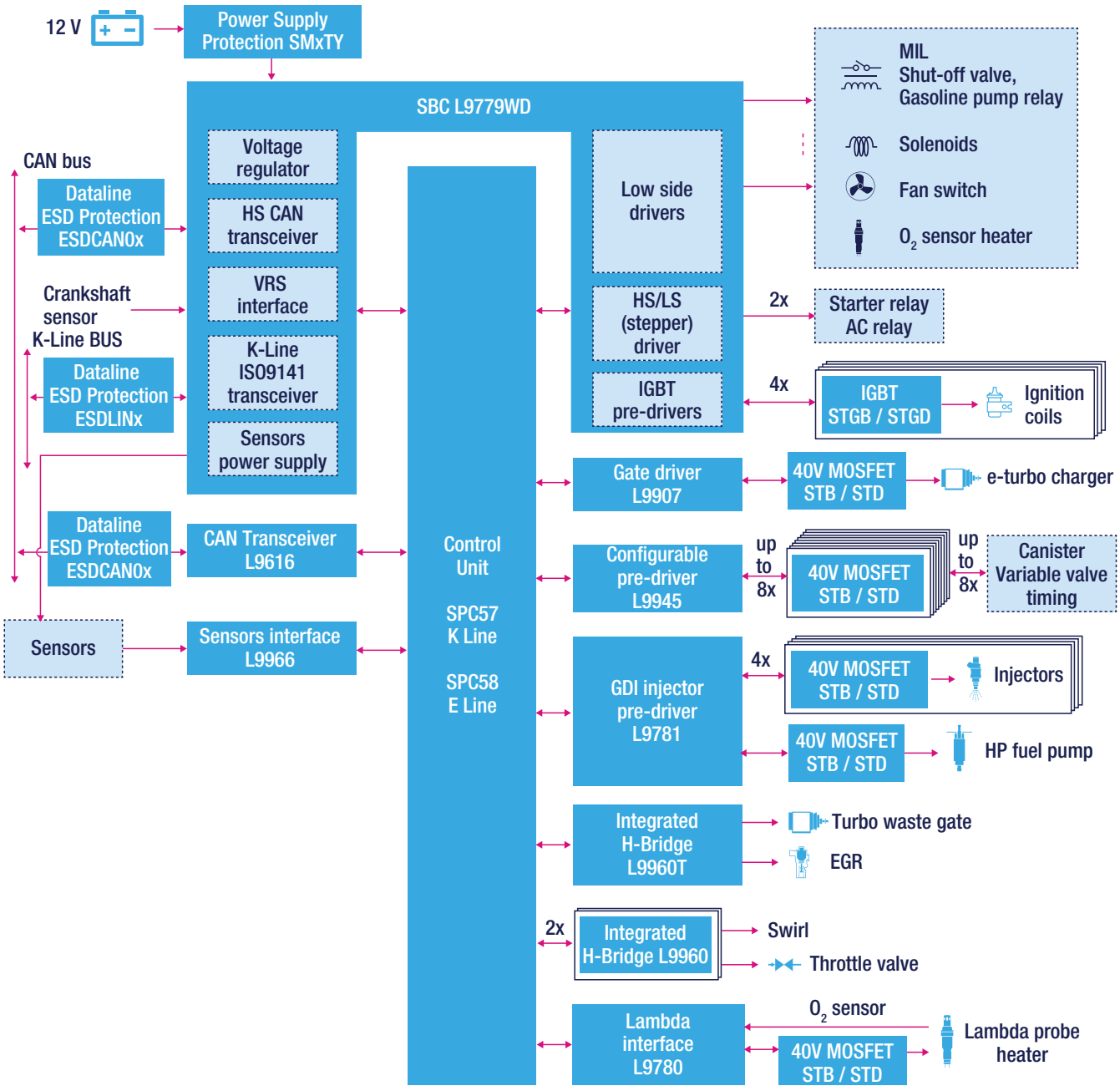
Alternator Regulator
Electric Turbo Compressor
Fuel Pump
Motorcycle Engine Control
Selective Catalytic Reduction
Transmission

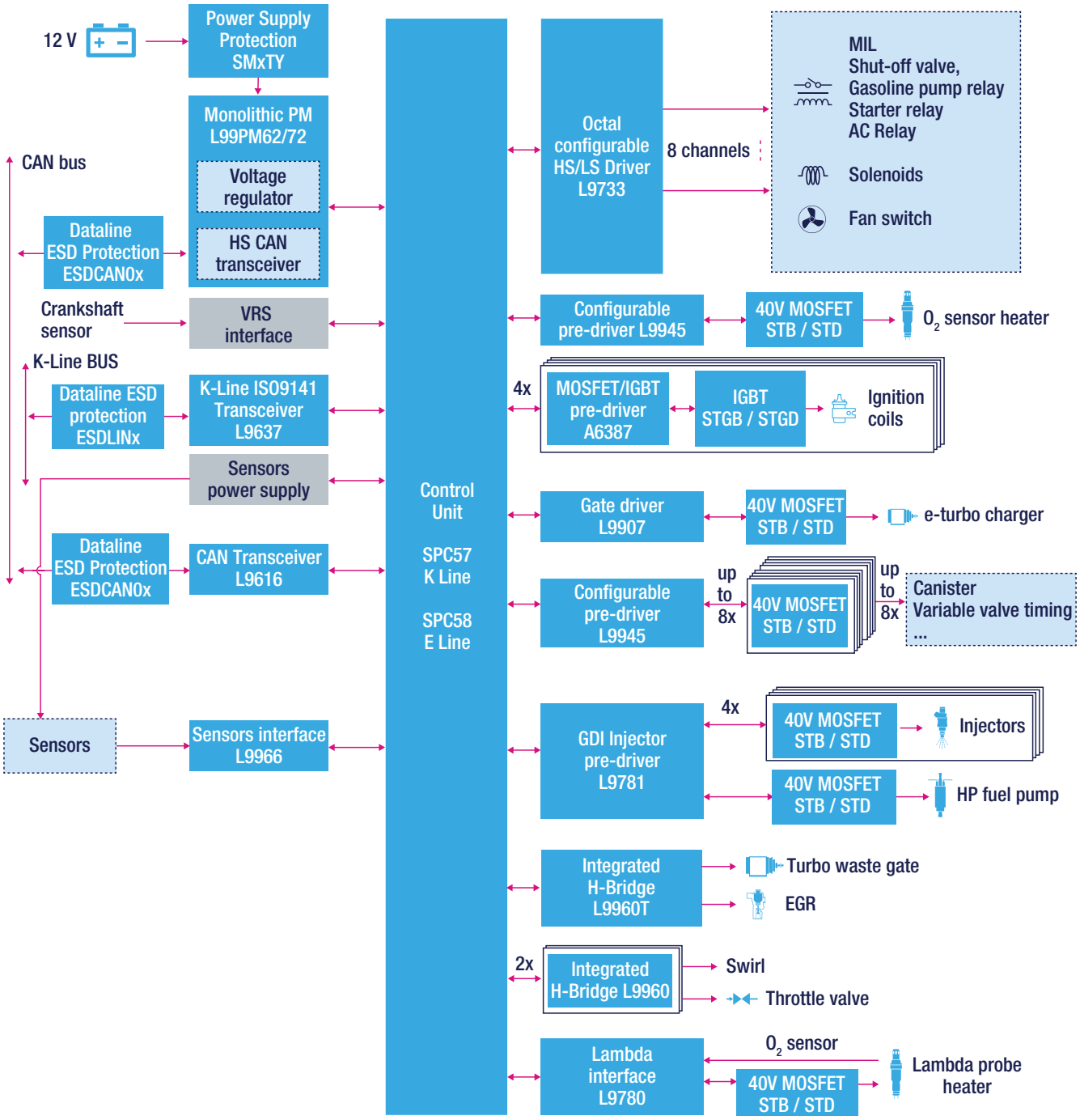
GASOLINE DIRECT INJECTION (GDI)

Governmental regulations, energy concerns and market requirements for very high performing vehicles brought the automakers to develop enhanced engine solutions. A key application combining fuel saving and high performances is Gasoline Direct Injection (GDI).

ST, with a strong portfolio of advanced technologies, can provide dedicated solutions for all the gasoline direct injection application needs. Our highly integrated System Basis Chips (SBC) combine all the required functions, including voltage regulation, bus interface, high/low side drivers, etc.

Gasoline Direct Injection (GDI)





FIND OUT MORE

www.st.com/gasoline-direct-injection

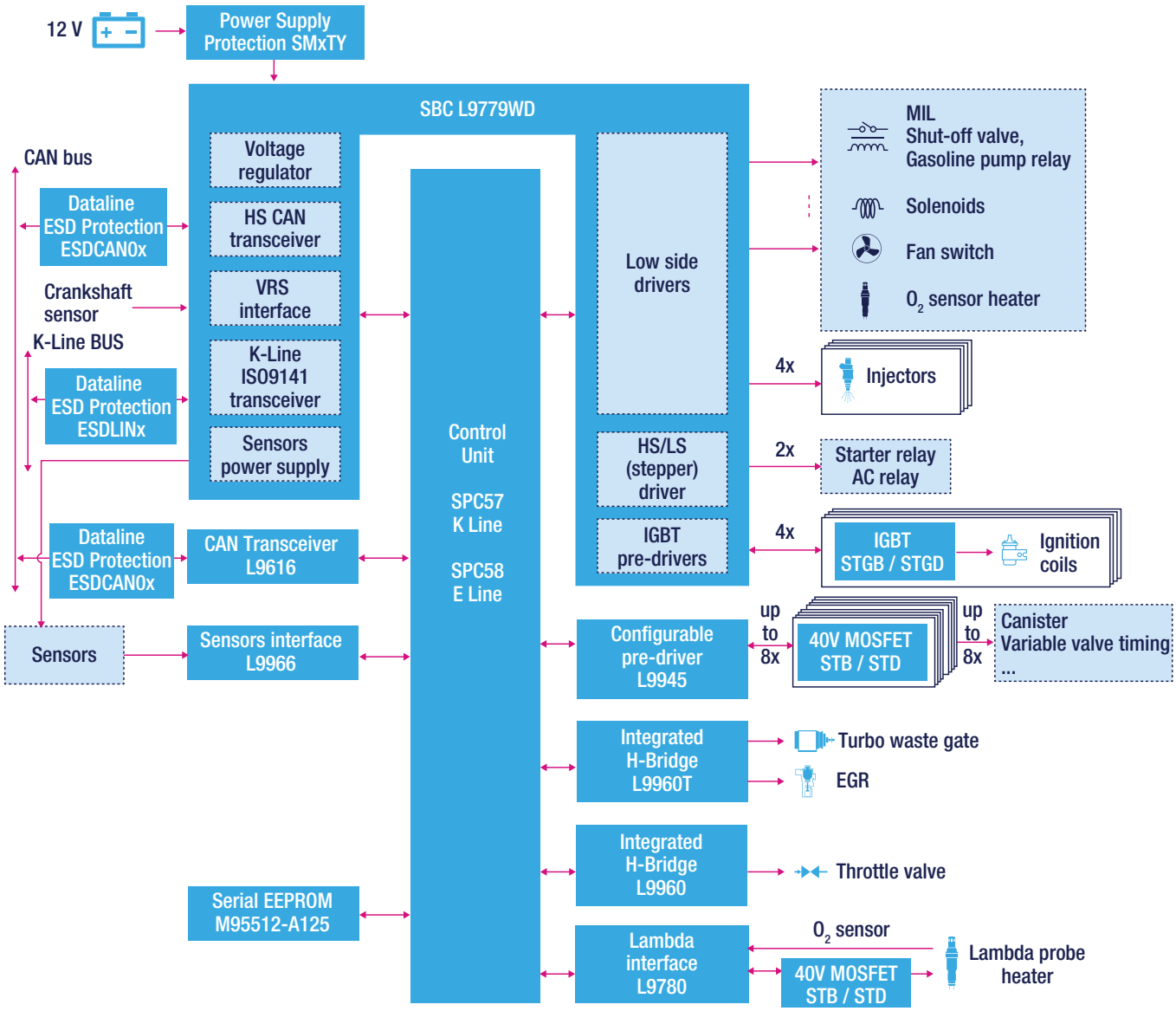
GASOLINE MULTI-POINT INJECTION

Gasoline multi-point fuel injection (MPI) is the most widely used powertrain system for spark ignition engines. This system, where fuel is injected at low pressure in the inlet air manifold, is a proven, robust and simple technology.

To control and optimize performance, a wide range of semiconductor solutions are required that are specifically designed for automotive applications.

We have a wide and comprehensive offer including SPC5 32-bit microcontrollers and specifically designed System Basis Chips (SBC) that combine voltage regulators for the various DC rails, bus interface ICs for the most common standards including CAN, ISO 9141 K-line, Variable Reluctance Sensors (VRS) and high- and low-side drivers.

Gasoline Multi-point Injection



FIND OUT MORE

www.st.com/gasoline-multi-point-injection

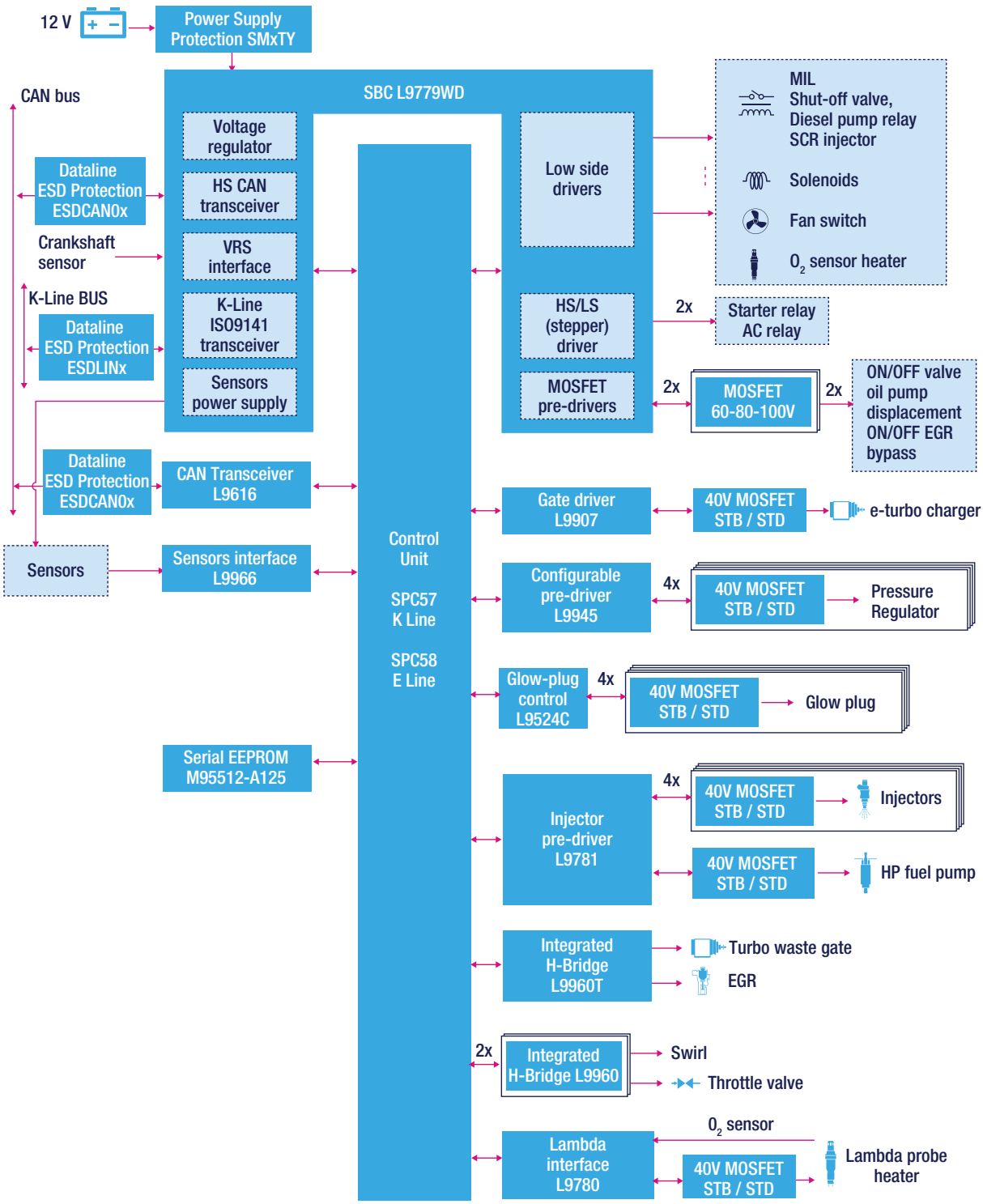
DIESEL DIRECT INJECTION

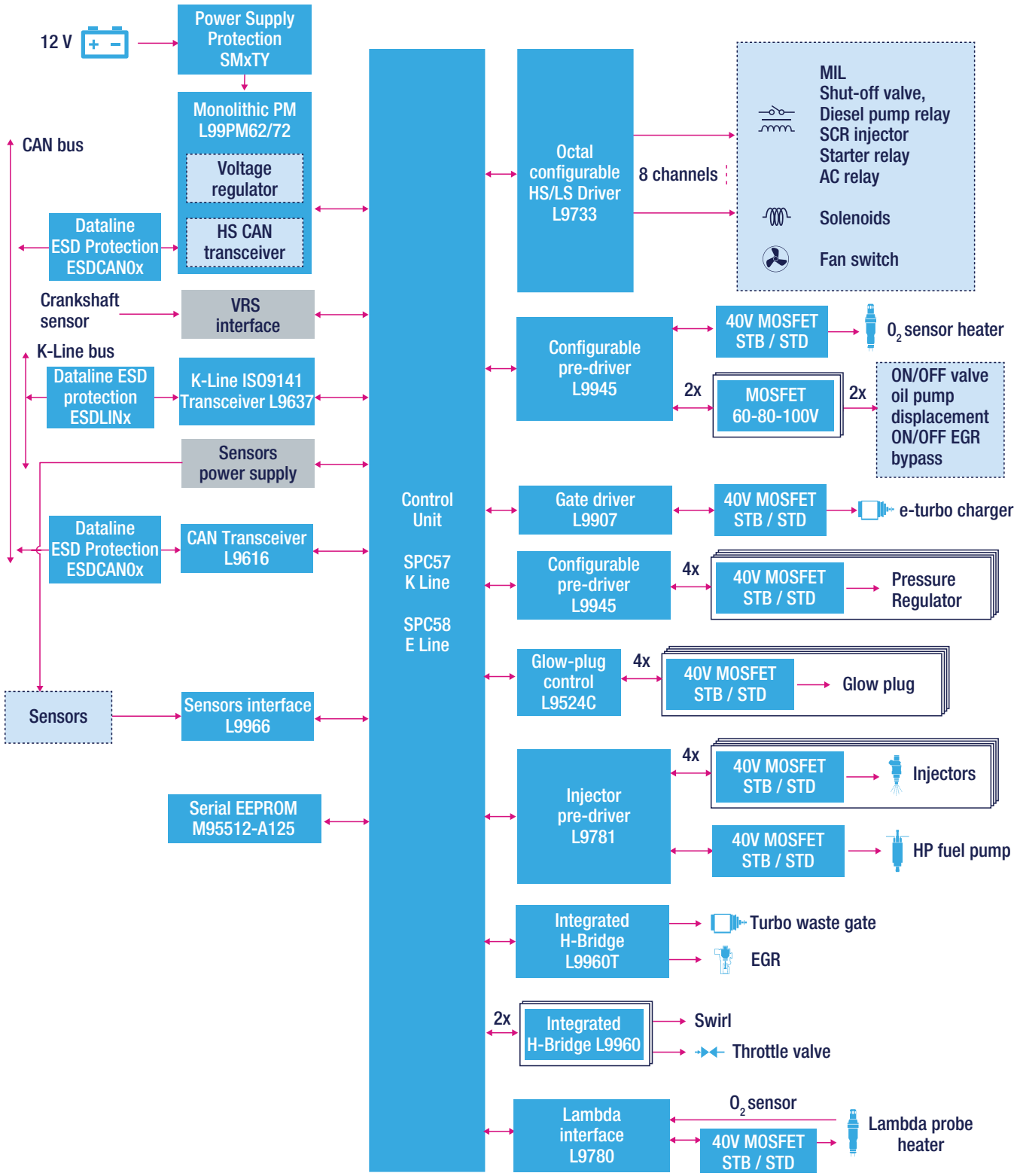
The diesel engine is one of the most efficient types of internal combustion engine. Advanced fuel injection technologies based on high-pressure common rail systems and optimized exhaust gas after-treatment systems help reduce noise and particle emissions while maintaining high performance and efficiency.

The use of electronic control plays an increasingly central role in optimizing performance at the appropriate cost point while helping ensure compliance with emission regulations and provide greater fuel efficiency.

We have a complete offer with specifically designed System Basis Chips (SBC) that combine voltage regulators for the various DC rails, bus interface ICs for the most common standards including CAN, ISO 9141 K-line, Variable Reluctance Sensors (VRS) and high- and low-side drivers. The SPC5 32-bit microcontroller family can provide the processing power and connectivity.

Diesel Direct Injection





FIND OUT MORE

www.st.com/diesel-direct-injection

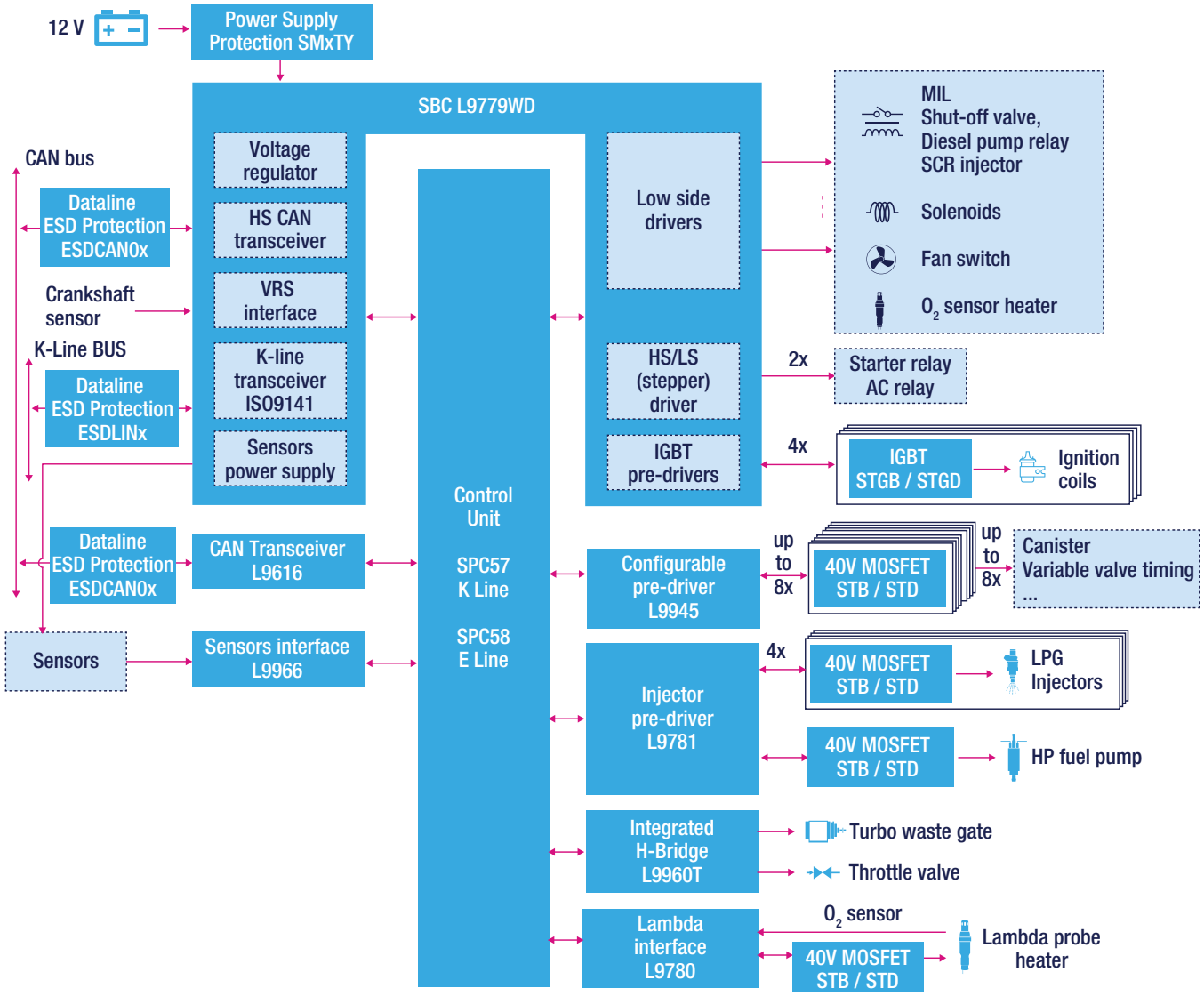
LPG ENGINE CONTROL

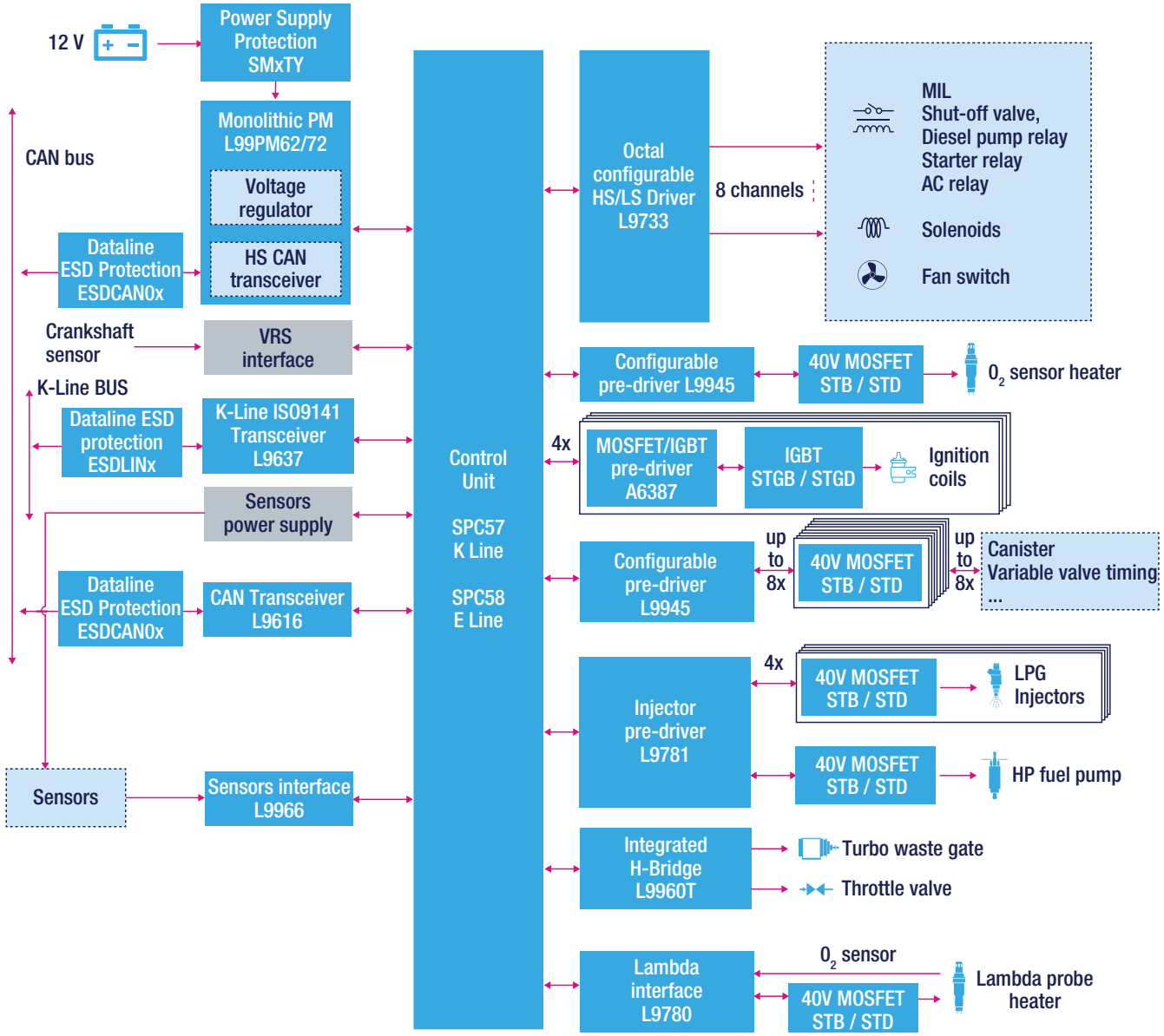
The growing demand for engines with reduced fuel costs or tax and mobility incentive schemes implemented in many countries has pushed car manufacturers to develop systems running on alternative fuels. Gasoline internal combustion engines running on Liquid Petroleum Gas (LPG) are based on proven technologies and typically have lower emissions and lower fuel costs than gasoline and diesel vehicles.

LPG is often used in bi-fuel vehicles, where it can be used alternatively with gasoline or diesel.

We have a wide and comprehensive offer including SPC5 32-bit microcontrollers and specifically designed System Basis Chips (SBC) that combine voltage regulators for the various DC rails, bus interface ICs for the most common standards including CAN, ISO 9141 K-line, Variable Reluctance Sensors (VRS) and high- and low-side drivers.

LPG Engine Control





FIND OUT MORE

www.st.com/lgp-engine-control

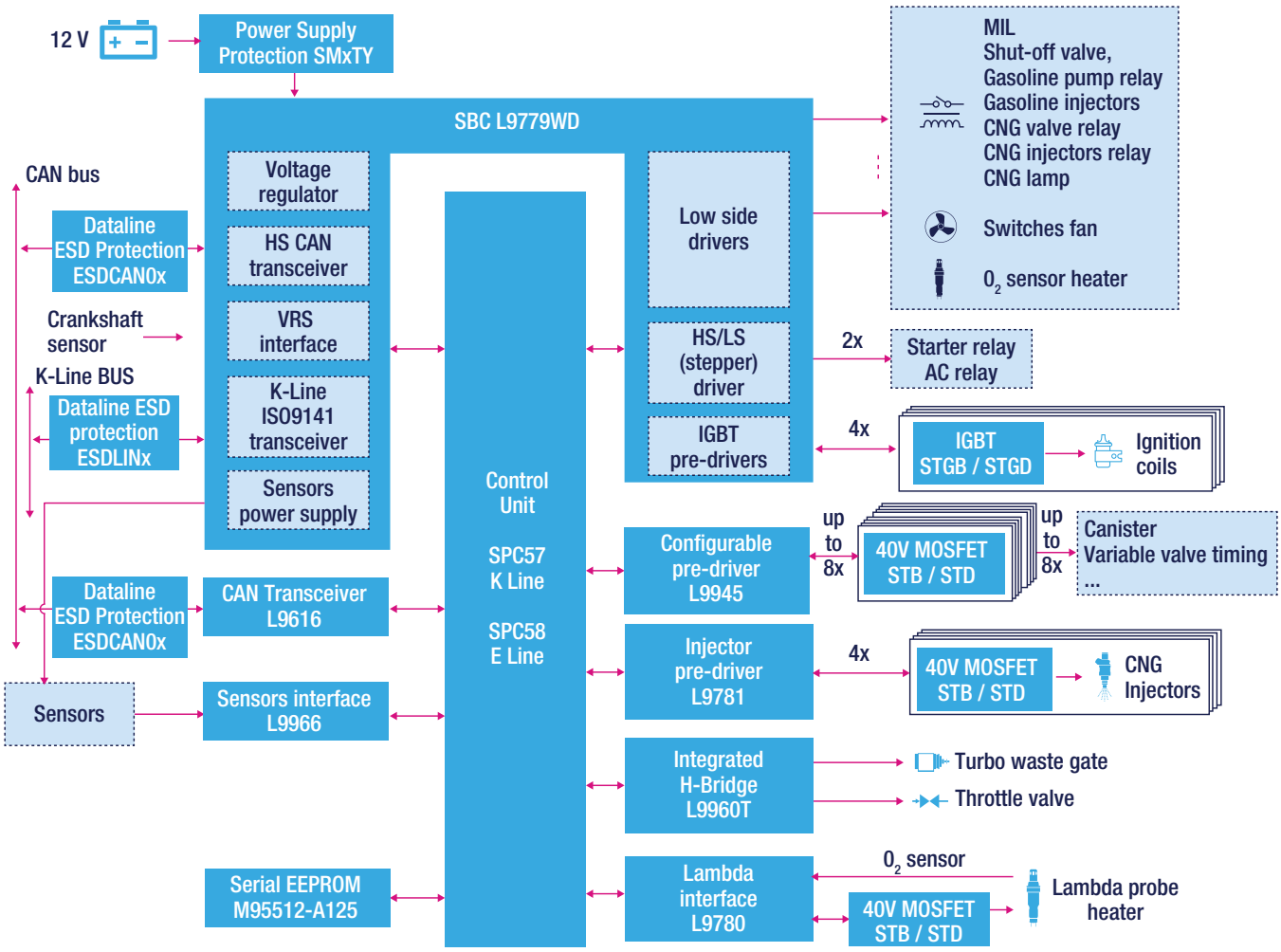
CNG ENGINE CONTROL

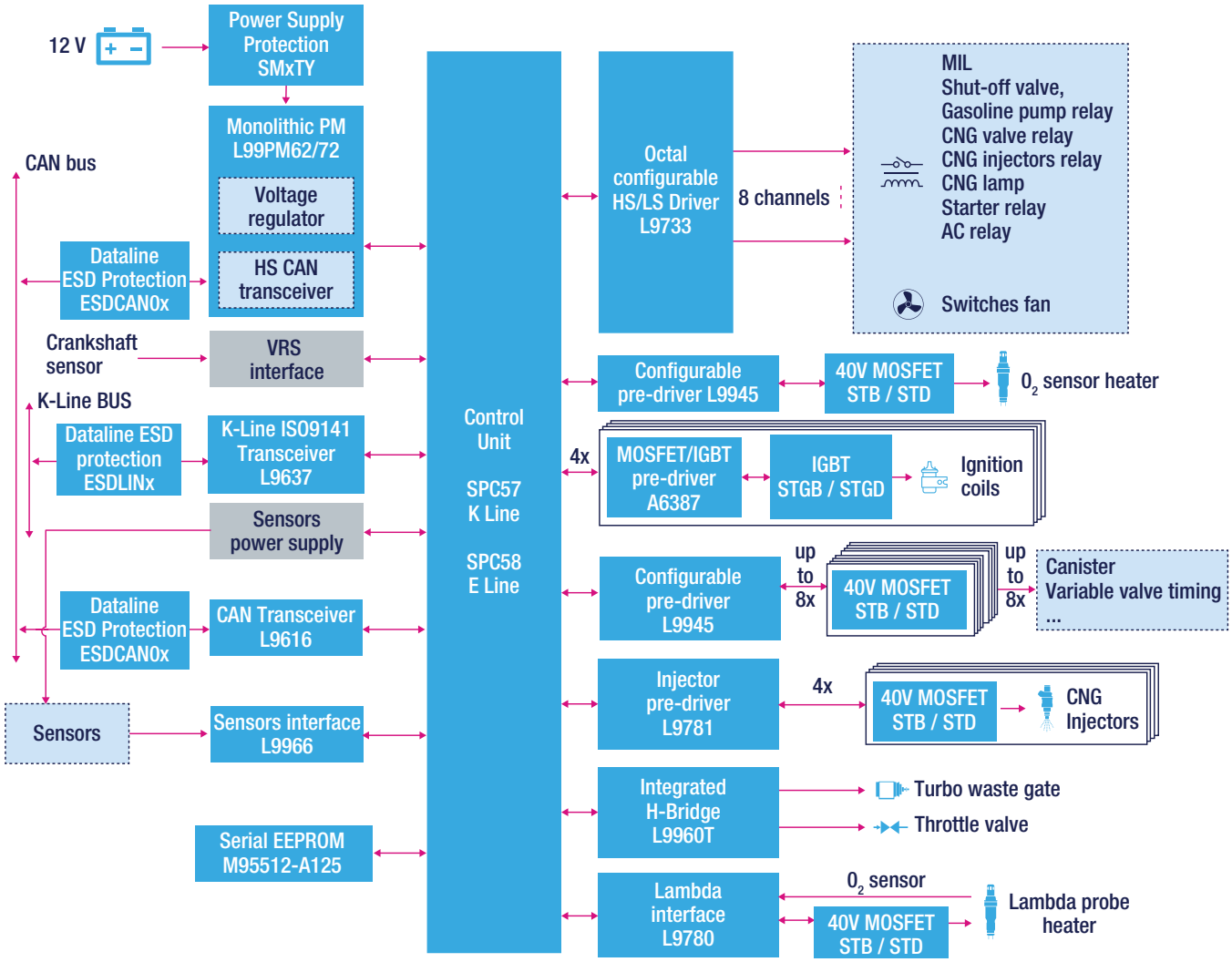
The growing demand for engines with reduced fuel costs or tax and mobility incentive schemes implemented in many countries has pushed car manufacturers to develop systems running on alternative fuels. Gasoline internal combustion engines running on Compressed Natural Gas (CNG) are based on proven technologies and typically have lower emissions and lower fuel costs than gasoline and diesel vehicles.

CNG is often used in bi-fuel gasoline vehicles, where it can be used alternatively with gasoline.

ST offers dedicated solutions for controlling powertrains in CNG and dual fuel vehicles.

CNG Engine Control





FIND OUT MORE

www.st.com/cng-engine-control

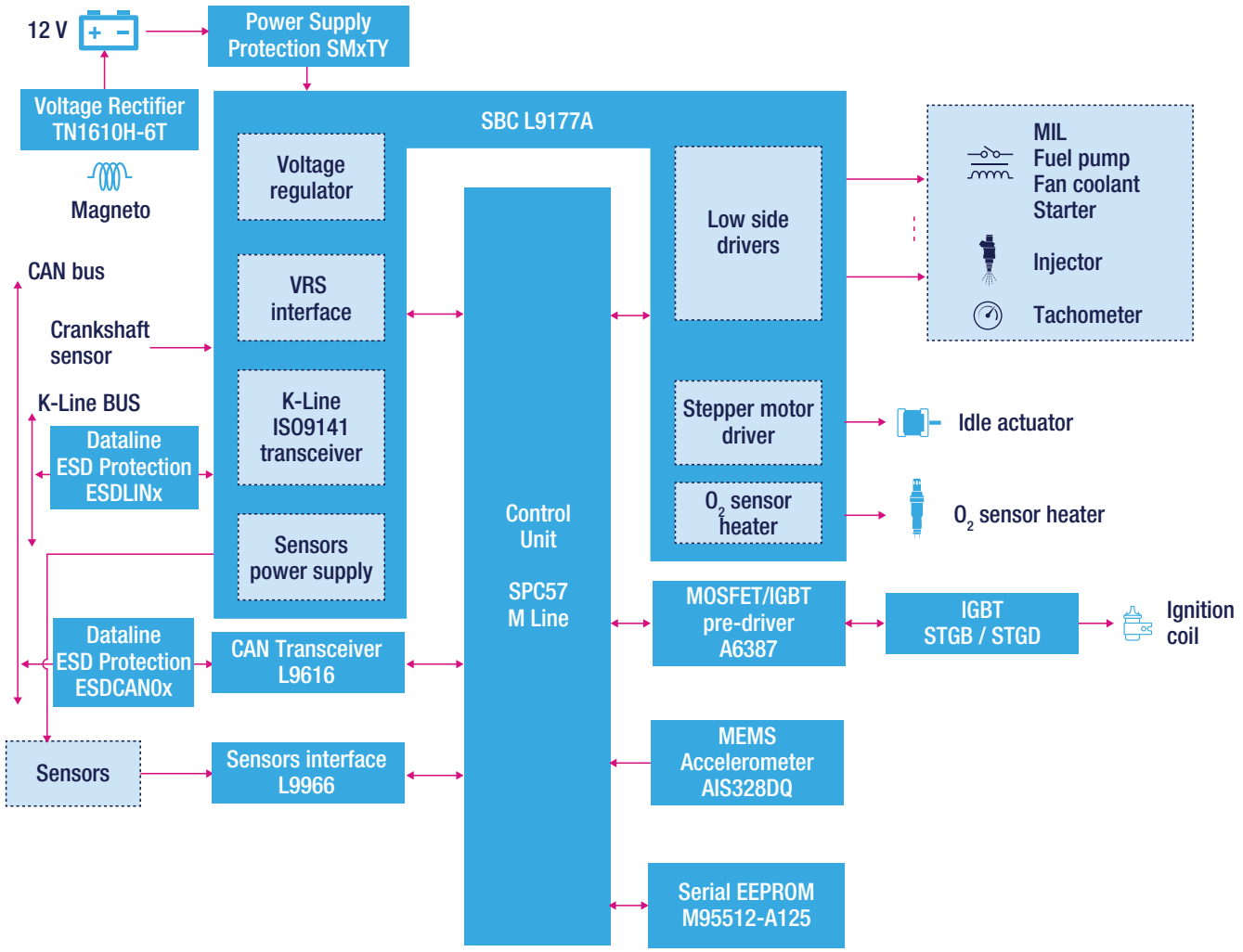
MOTORCYCLE ENGINE CONTROL / MONO-CYLINDER

Increasingly strict motorcycle emission regulations require engine manufacturers of both traditional and emerging markets to replace carburetors with electronically controlled injection systems.

Improved fuel efficiency and reduced emissions as well as driving performance – all at an appropriate cost point – are the key challenge for motorcycle manufacturers, especially those building smaller motorcycles and scooters.

We offer dedicated solutions for motorcycle engine management. These include SPC5 32-bit microcontrollers and specifically designed System Basis Chips (SBC) that combine voltage regulators for the various DC rails, bus interface ICs for the most common standards including CAN, ISO 9141 K-line, Variable Reluctance Sensors (VRS) and high- and low-side drivers.

Single-Cylinder Motorcycle Engine



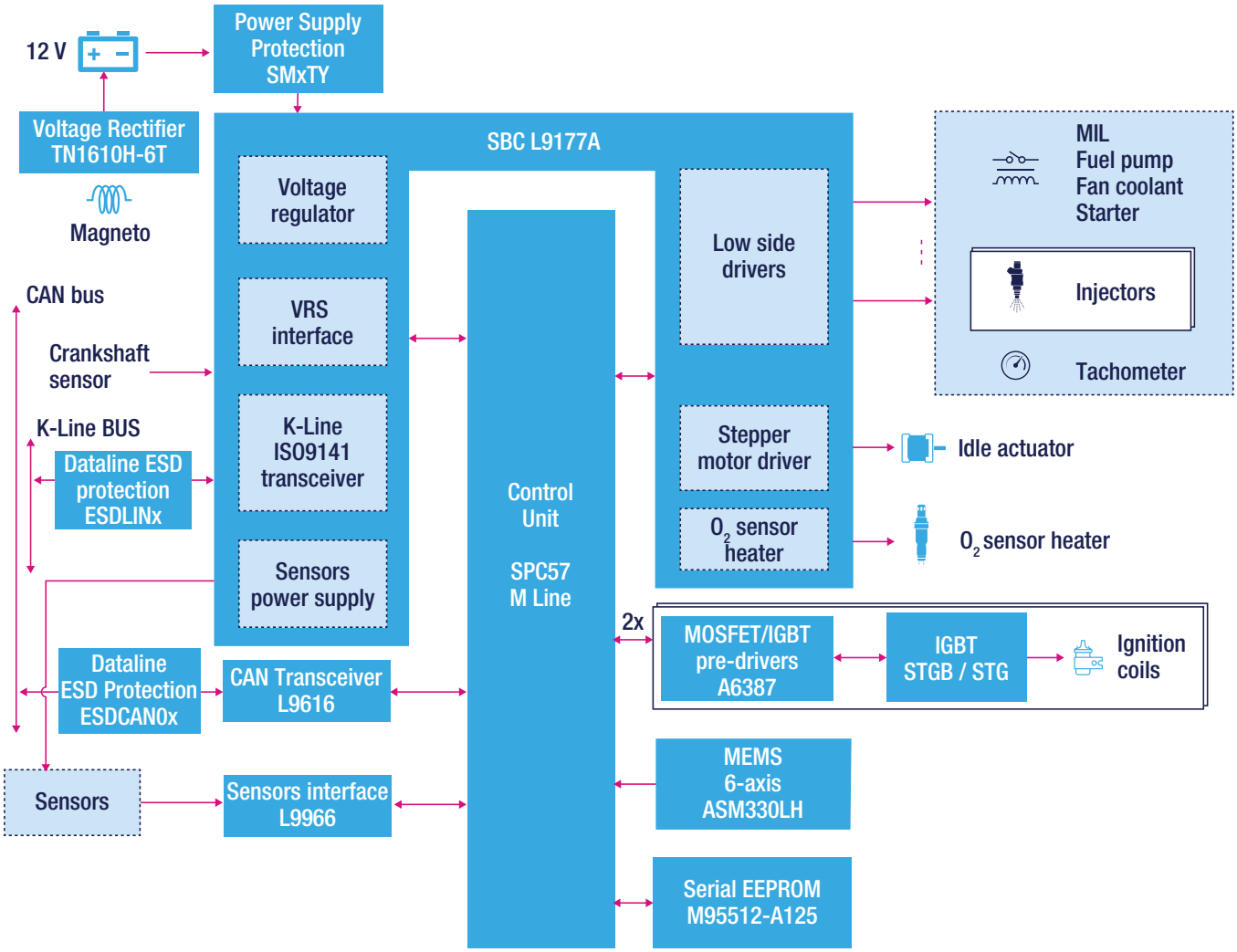
FIND OUT MORE

www.st.com/single-cylinder-motorcycle-engine

MOTORCYCLE BI-CYLINDER

Solutions for bi-cylinder motorcycle engine management. SPC5 32-bit microcontrollers for the control unit and specifically designed System Basis Chips (SBC) that combine voltage regulators, bus interfaces, Variable Reluctance Sensors (VRS), low-side drivers and O_2 sensor heaters.

Two-Cylinder Motorcycle Engine



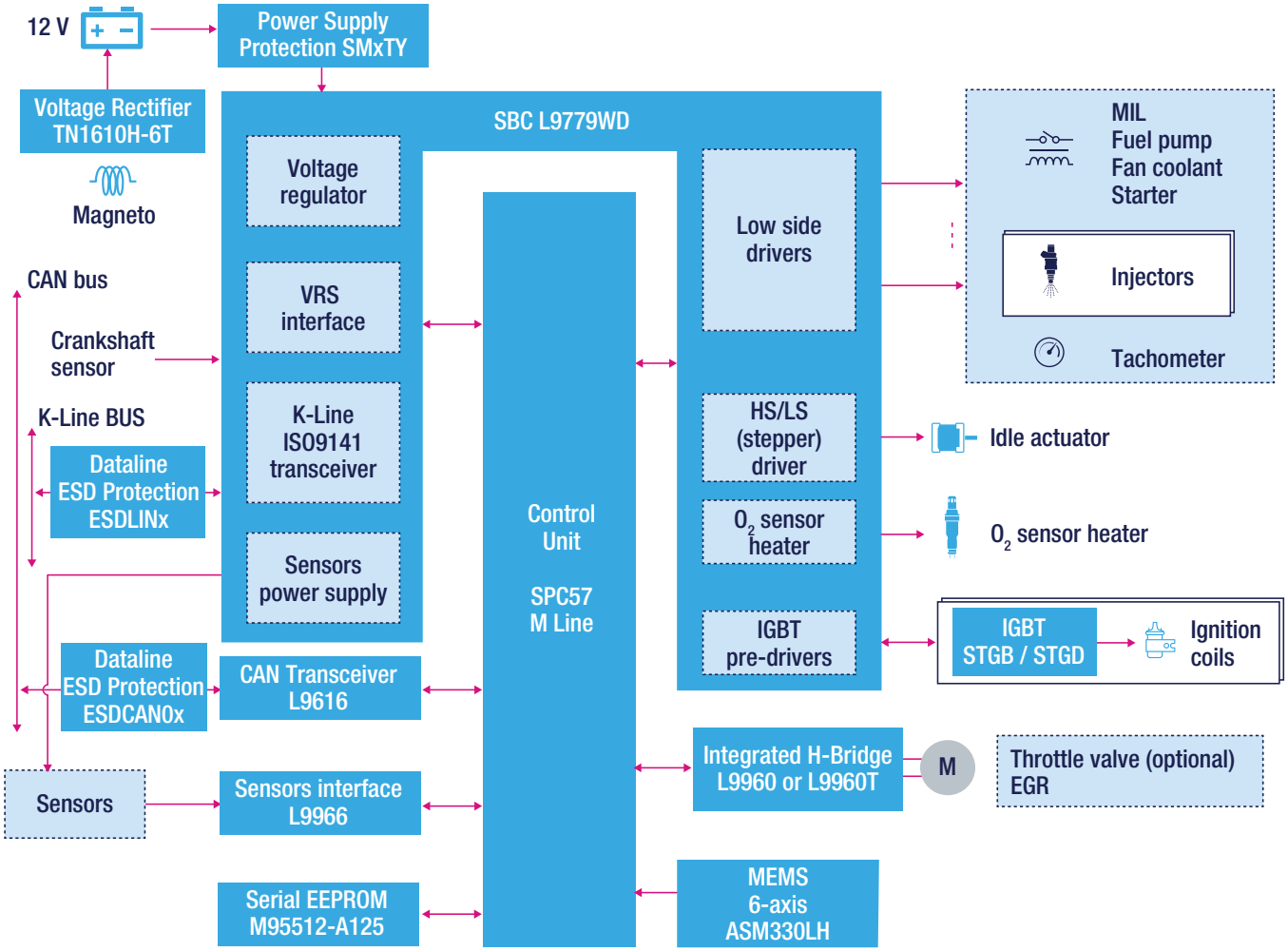
FIND OUT MORE

www.st.com/two-cylinder-motorcycle-engine

MOTORCYCLE MULTI-CYLINDER

Solutions for multi-cylinder motorcycle engine management. SPC5 32-bit microcontrollers for the control unit and specifically designed System Basis Chips (SBC) that combine voltage regulators, bus interfaces, Variable Reluctance Sensors (VRS), low-side drivers, O_2 sensor heaters and IGBT pre-drivers.

Multi-Cylinder Motorcycle Engine



FIND OUT MORE

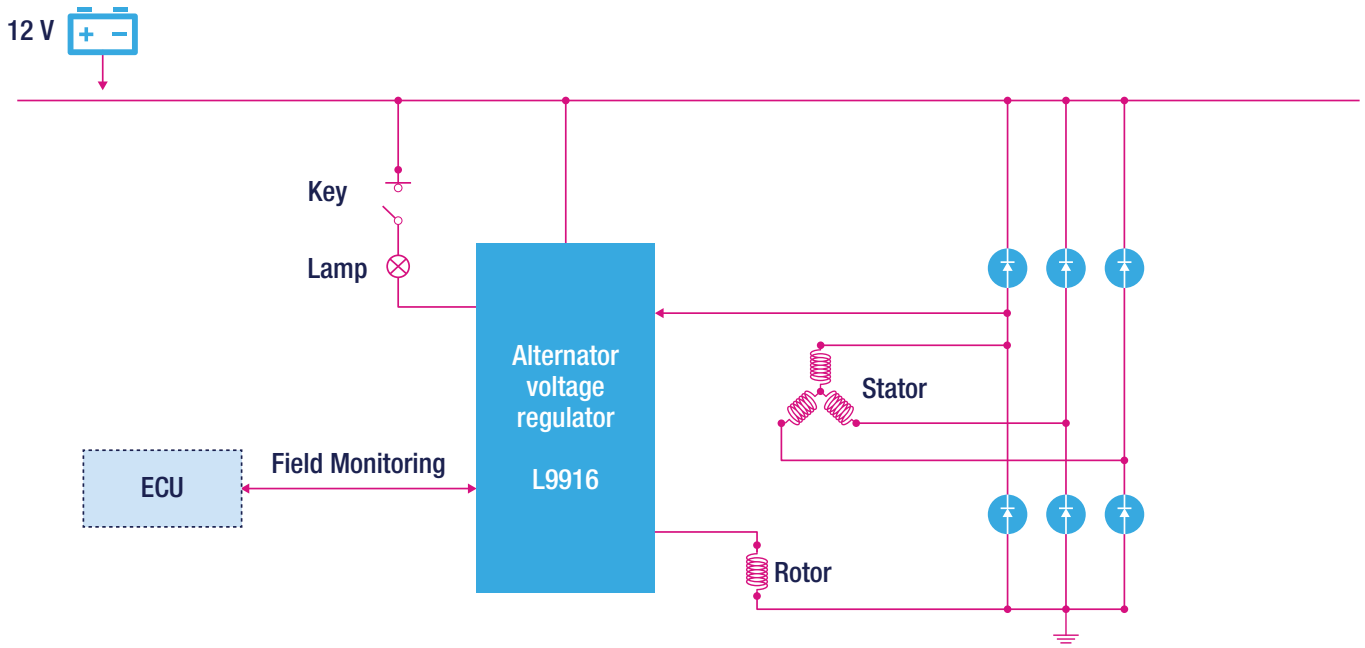
www.st.com/multi-cylinder-motorcycle-engine

ALTERNATOR REGULATOR

Found in every Internal Combustion Engine (ICE) vehicle, the alternator – and its associated control electronics – is becoming increasingly important as a key component due to the growing number of electrically actuated functions and their impact on overall power requirements.

ST has an extensive range of efficient and reliable control solutions that can be integrated using any of the various protocols used by different OEMs. Our offer covers from basic multi-function IC solutions up to advanced ECU IC controlled solutions.

Alternator Regulator



FIND OUT MORE

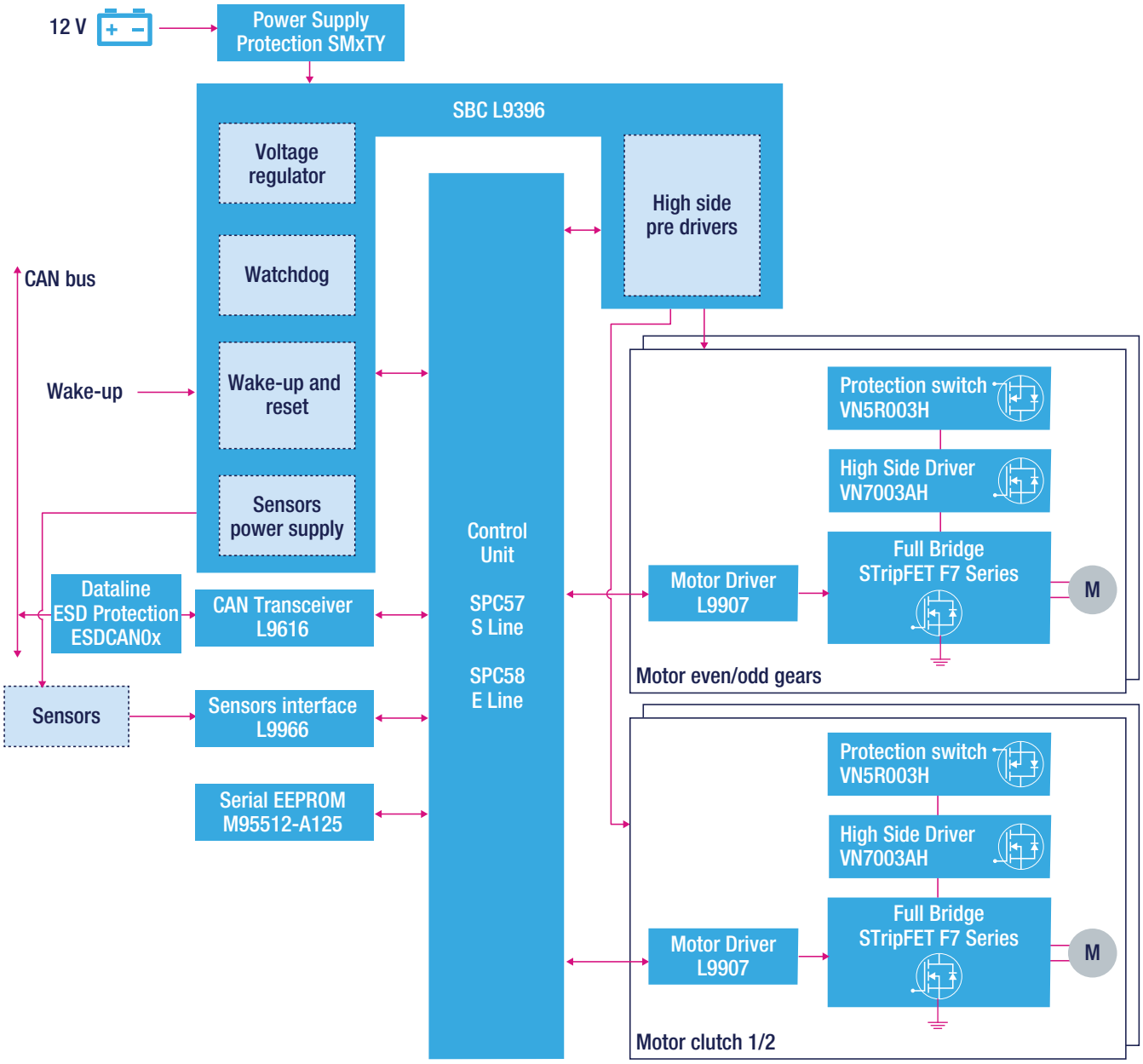
www.st.com/alternator-regulator

TRANSMISSION CONTROL / ELECTRIC TRANSMISSION

An Automated Manual Transmission (AMT) is an advanced control system for gear shifting that eliminates the need for a clutch pedal while still letting the driver decide when to change gears. This electronically actuated and synchronized clutch and gear-box can help improve driving experience – especially in city traffic – as it completes the clutch and gear-shift operations more quickly and accurately than a human.

A complete electric transmission solution including SPC5 32-bit microcontrollers for control units, an SBC with High-side pre-drivers, Motor Driver ICs and STripFET™ Full-Bridge power devices.

Electric Transmission



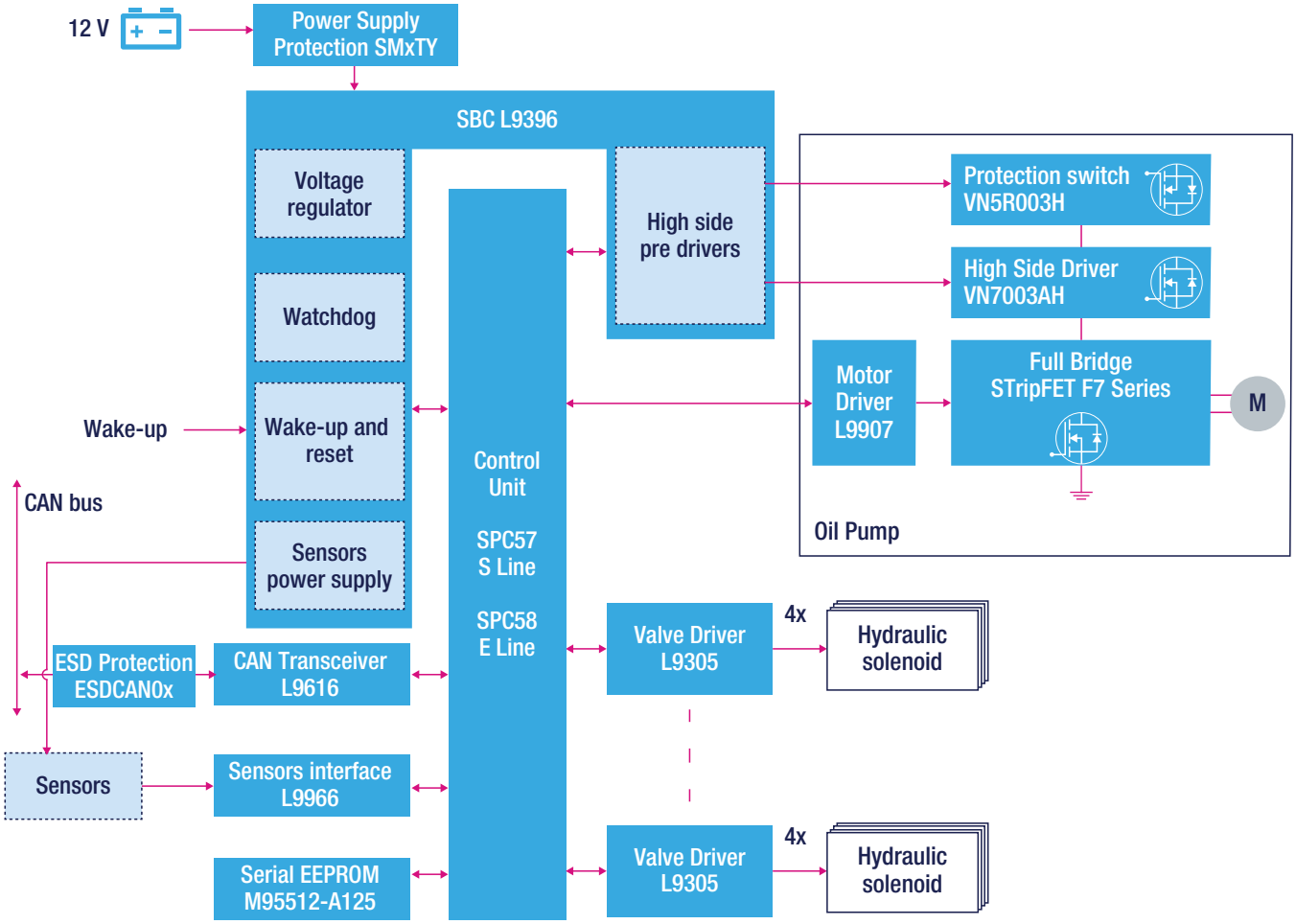
FIND OUT MORE

www.st.com/electric-transmission

HIGH-END HYDRAULIC TRANSMISSION

A complete High-end Hydraulic Transmission solution including SPC5 32-bit microcontrollers for control units, an SBC with High-side pre-drivers, Motor Driver ICs and STripFET™ Full-bridge power devices.

High-end Hydraulic Transmission



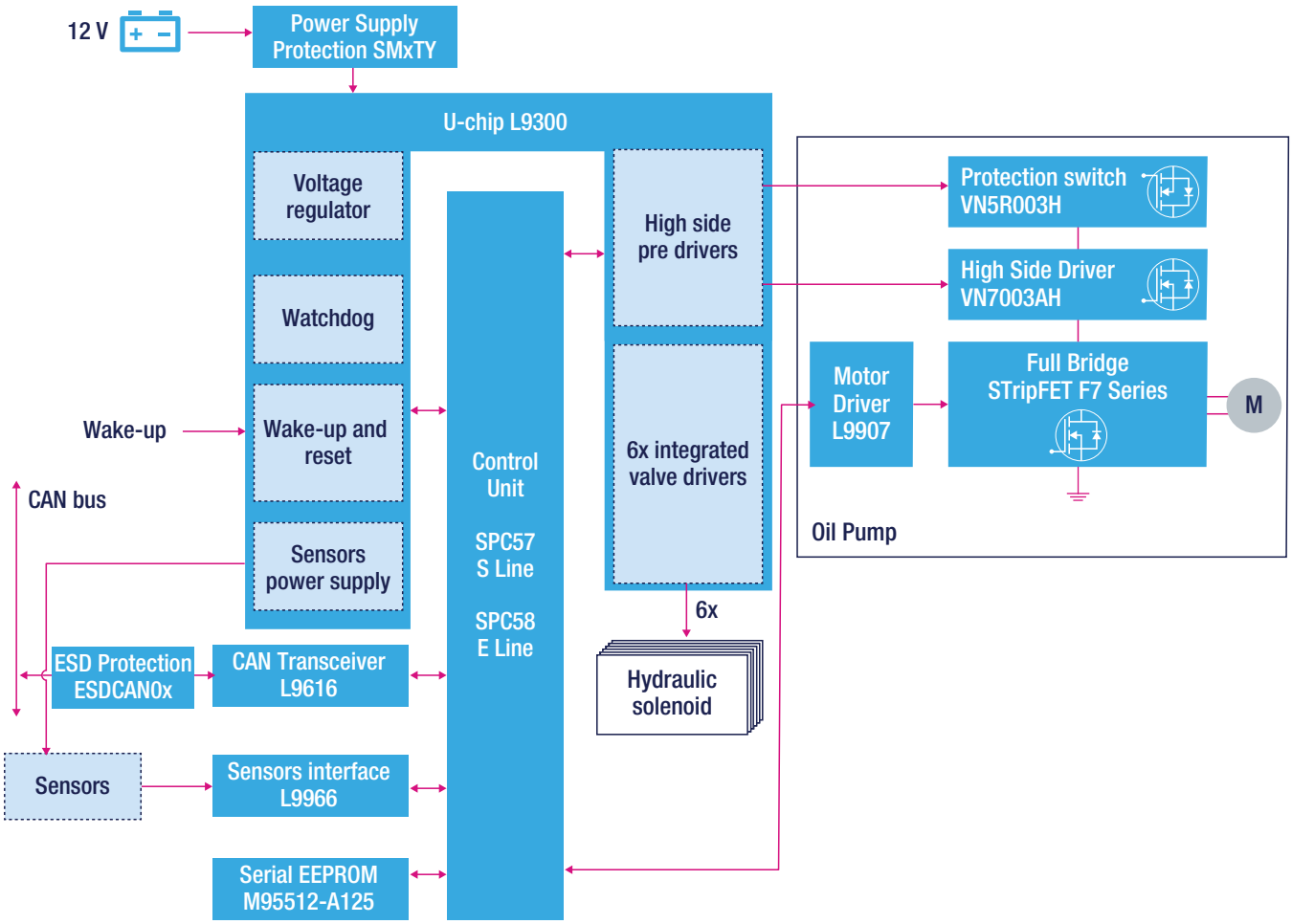
FIND OUT MORE

www.st.com/high-end-hydraulic-transmission

CVT AND LOW-END HYDRAULIC TRANSMISSION

A complete Continuously Variable Transmission (CVT) and low-end Hydraulic Transmission solution including SPC5 32-bit microcontrollers for control units, an SBC with high and low -side pre-drivers, Motor Driver ICs and STripFET™ Full-bridge power devices.

CVT and Low-end Hydraulic Transmission



FIND OUT MORE

www.st.com/cvt-and-low-end-hydraulic-transmission

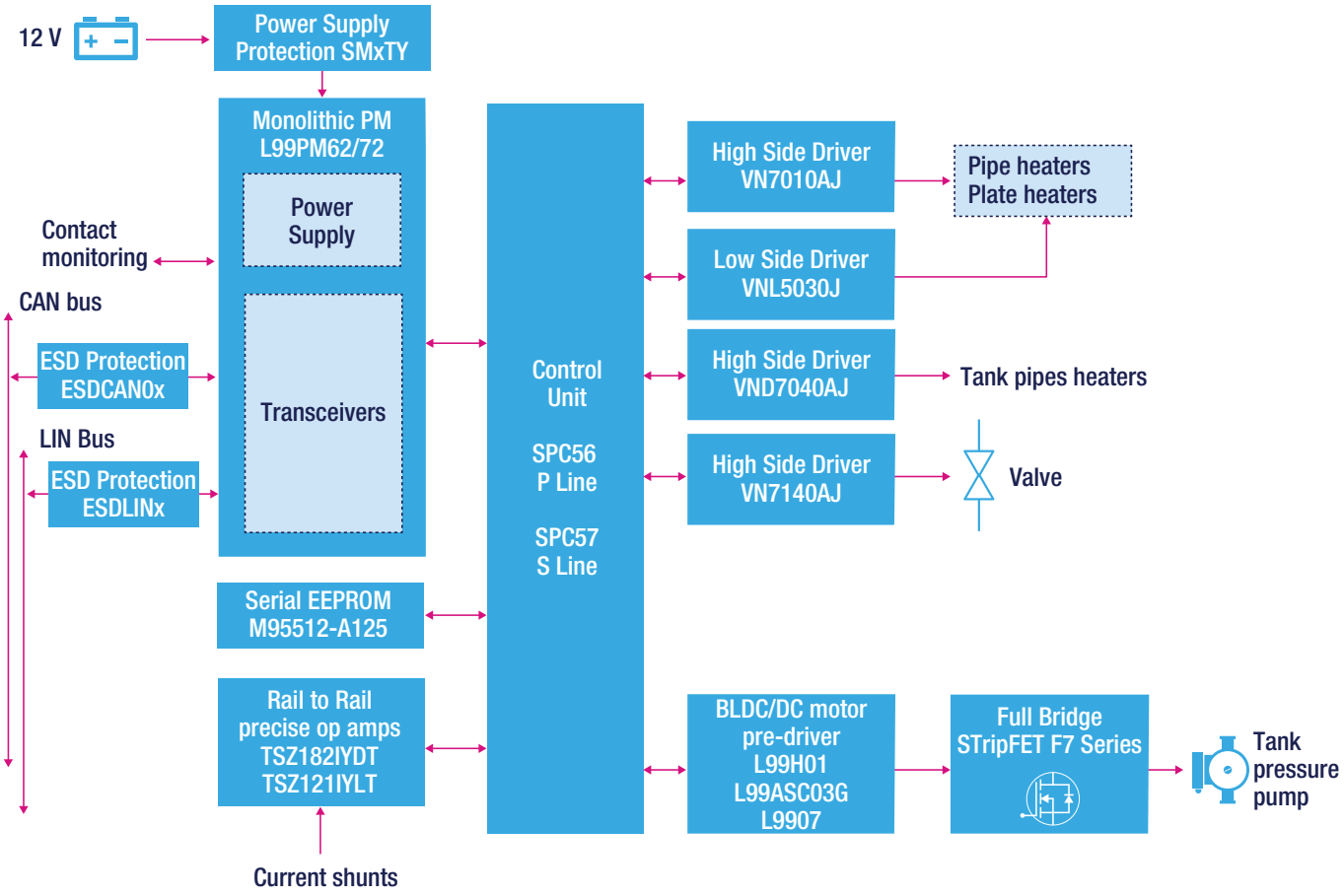
SELECTIVE CATALYTIC REDUCTION (SCR)

Selective Catalytic Reduction (SCR) is a chemical process converting nitrogen oxides (NOx) into diatomic nitrogen and water as well as a small amount of carbon dioxide. This process is facilitated by the addition of automotive-grade urea – known as Diesel Exhaust Fluid (DEF) or commercial brands like AdBlue and Bluetech – to convert hazardous NOx emissions from diesel engines into harmless nitrogen and water.

The SCR block controls a pump that draws DEF from its tank and injects it, with an appropriate dosing valve, into the diesel exhaust gases. To optimize fuel efficiency, a gas sensor is located after the catalytic reduction process and its information is fed to the diesel engine ECU that combines this information with the engine status and gives to the SCR unit accurate information regarding the right amount of DEF liquid to release.

We have a range of three-phase gate drivers and Power MOSFETs for the commonly used brushless DC (BLDC) motors, as well as SPC5 32-bit microcontrollers and dedicated power management ICs with voltage regulators and CAN and LIN Interface ICs to simplify the design of high-efficiency solutions.

SCR



FIND OUT MORE

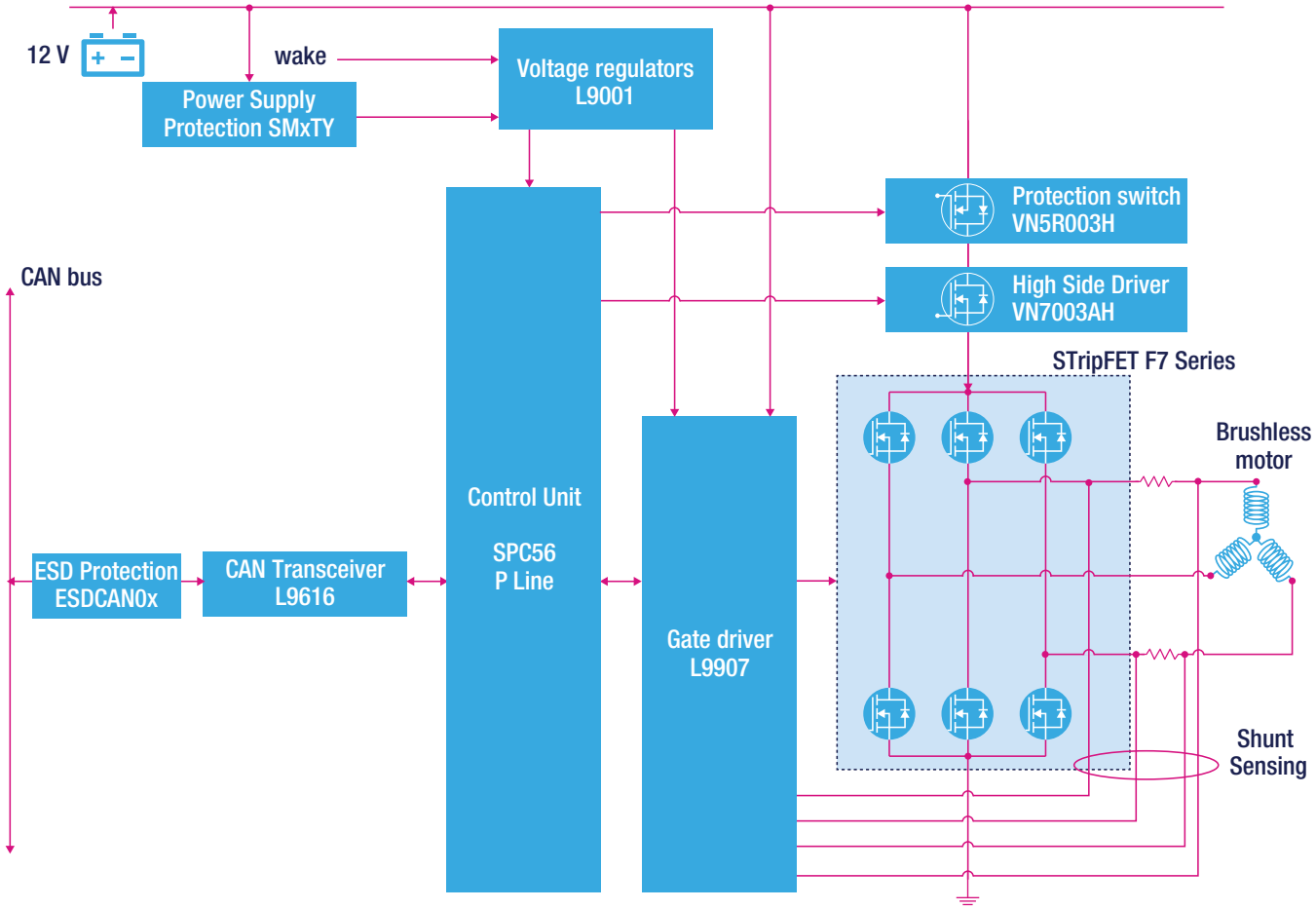
www.st.com/selective-catalytic-reduction-scr

FUEL PUMP

Tackling the challenge of achieving improved fuel efficiency, reducing CO_2 emissions and increasing the reliability of vehicles means looking at every possible source of energy loss and rethinking the way the associated sub-system is built. This is why electric fluid pumps are replacing mechanical systems as they can help reduce losses from hydraulic friction.

Electric fuel pumps are most often implemented with brushless DC (BLDC) motors and ST has a complete range of three-phase gate drivers and Power MOSFETs to power them. SPC5 32-bit automotive-grade microcontrollers plus dedicated voltage regulators and power management ICs simplify the design of high-efficiency solutions.

Fuel Pump



FIND OUT MORE

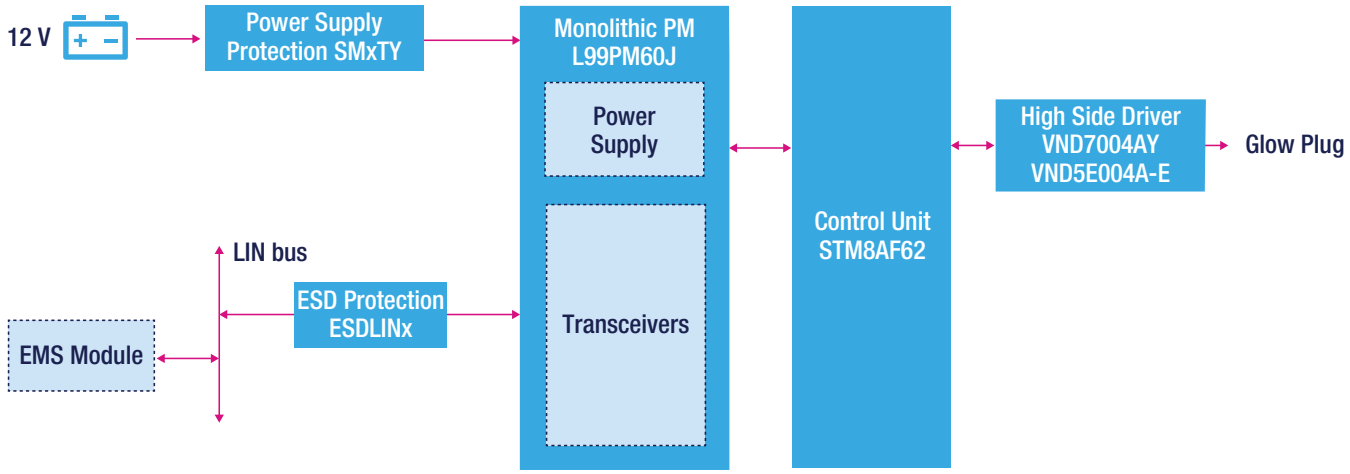
www.st.com/fuel-pump

GLOW PLUG CONTROL

A glow plug is a pencil-shaped piece of metal with a heating element at the tip. Despite its simple design and electronic content, it plays a fundamental role in diesel injection systems by igniting the fuel even when the engine is insufficiently hot for normal operation, thus reducing the cranking time to start the engine.

ST has a range of solutions based on our proprietary VIPower™ silicon technology that enable compact and robust glow plug control unit design.

Glow Plug Control



FIND OUT MORE

www.st.com/glow-plug-control

Key Technologies

RESEARCH & DEVELOPMENT AND MANUFACTURING

To keep its technology edge, ST maintains a strong commitment to innovation, with approximately 7,400 people working in R&D and product design and spending about 16% of its revenue in R&D. Among the industry's global technology leaders, ST owns and continuously refreshes a substantial patent library (~17,000 patents; ~9,500 patent families and ~500 new patent filings per year).

The Company 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), Silicon Carbide (SiC), VIPower™, and MEMS technologies.

ST believes in the benefits of owning manufacturing facilities and operating them in close proximity and coordination with its R&D operations. ST has a worldwide network of front-end (wafer fabrication) and back-end (assembly,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.

VIPOWER™

VIPower™ is a technology developed by ST and in production since 1991. Vertical Intelligent Power technologies provide 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-Mixed design.

VIPower™ technology is the perfect choice for the control of automotive exterior and interior lighting, DC motors for seat adjustment, door locks and window lifts, resistive heaters and any kind of power load that needs control and sensing as well as power. VIPower™ products are replacing a host of electro-mechanical solutions, and providing lower power, lower chip count and lower pin-count solutions.

VIPower™ technology will play 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 ECUs microcontroller.

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: improvement 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.

BCD technology is used widely in the automotive industry and products are found in active suspension, braking, transmission, airbag, car audio and notably engine management and charging applications. A key engine management application is for fully integrated System-on-Chip solutions for CO_2 reducing Gasoline Direct Injection (GDI) systems. For EV charging BCD is ideal for Battery Management Systems (BMS).

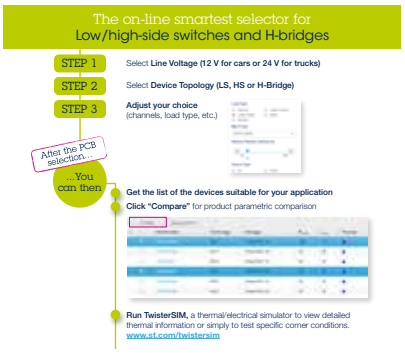
Development Tools

PRODUCT SELECTORS, SAMPLES, EVALUATION BOARDS

ST provides a set of Smart Selectors 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 provides schematics, BOM and Gerber files to facilitate your hardware design and demonstration software packages are available too.

VIPower™ Smart Selector

VIPower's Smart Selector is designed to help and assist users to choose the best VIPower™ high/low-side switch or H-bridge device for their Automotive application.
All you need to do is select a few parameters related to your specific application, and the selector provides the relevant device. Parameters include nominal voltage (12 V for automotive cars or 24 V for trucks), a topology (high-side, low-side or h-bridge), the number of channels and type of load to drive (bulbs, motors, etc.). The selection can be further refined by setting source type (DC or PWM), temperature and PCB type.



FIND OUT MORE

www.st.com/vipower-smartselector

Easyboards

The Easyboard concept was created to give customers the chance to evaluate products without committing to the expense, time and resources typically needed to design a custom circuit board. Easyboards are simple and low-cost evaluation tools that connect a VIPower™ product to a load. This allows a straightforward evaluation of the device and of all the application functionalities, including the auto-protection capability for hazardous conditions. Each evaluation board includes a VIPower™ device soldered onto a small 2-layer PCB with heavy copper and thermal vias, to support maximum device current and customer-configured thermal relief strategies.
Easyboards come with the following part numbers:

- EV-VNx7xxx: VIPower M0-7 High Side Switches single, dual and quad channels for 12 V battery lines
- EV-VNx5Txxx: High Side Switches for 24V systems
- EV-VNH7xxx: Motor Control solutions

FIND OUT MORE

www.st.com/automotive-evalboards

SPC5 AUTOMOTIVE MCU EVALUATION TOOLS: EASIER EVALUATION AND FASTER DEVELOPMENT

A complete range of hardware evaluation and emulation tools supports the SPC5 family of automotive microcontrollers. Discovery and Premium development boards are available to support your development from preliminary evaluation through to advanced solution development.

ST Discovery boards, available for each product line, enable a quick and easy way to evaluate the microcontroller's main features. The expansion connector makes it easy to plug in application and extension modules for rapid prototyping.

ST Premium boards, available for all lines and packages, provide user access to the device's complete feature set and functionalities for advanced development. The SPC5 motherboards, used in combination with adapters, enable full access to all of the MCU's signals and peripherals (such as CAN, SPI, LIN, FlexRAY and Ethernet).

The offer is complemented by a series of emulation solutions for high-speed tracing, monitoring and bypassing.

A full range of state-of-the-art tools and software from major third parties is also available for the SPC5 family of automotive microcontrollers.

FIND OUT MORE

www.st.com/auto-sp5-mcu-evaltools

Dynamic Electro-Thermal simulator for devices in VIPower technology

TwisterSIM is a unique electro-thermal simulator that helps shorten the design solution cycle by enabling, in a few clicks, complex engineering evaluations with accurate simulations like loadcompatibility, wiring harness optimization, fault condition impact analysis, diagnostic behavior analysis and dynamic thermal performance.

A built-in Interactive selector provides a short list of suitable devices based on first level system requirements. It assists you in detailing your actual system configuration with layout, load and driving profile customization to build an accurate model of the final application.

TwisterSIM supports a large selection of Low/High-side driver/switches and H-bridges for Motor Control.

FIND OUT MORE

www.st.com/twistersim

VIPower-FINDER

VIPower smart product finder application for Android and iOS

VIPower-FINDER is the application available for Android™ and iOS™ that allows you to explore the ST VIPower product portfolio using portable devices. You can easily define the device that best fits your application using the Smart or the parametric search engine. You can also find your product thanks to the efficient part number search engine.

Key Features
- Smart, parametric or part number search capability for product
- Technical datasheet downloading and off-line consulting
- Ability to share technical documentation via social media or via email
- Available on Android™ and iOS™ app stores

FIND OUT MORE

www.st.com/vipower-finder

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Solutions for Smarter Driving
Mobility Services

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Content

Smart Driving

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 Driving products and solutions are making driving safer, greener and more connected through the combination of several of our technologies.

SAFER

Driving is safer thanks to our Advanced Driver Assistance Systems (ADAS) products – 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 units engine management systems, high-efficiency smart power electronics at the heart of all automotive sub-systems and Silicon Carbide devices for hybrid and electric vehicle applications.

MORE CONNECTED

And vehicles are more connected using our infotainment-system and telematics processors and sensors, as well as our radio tuners and amplifiers, positioning technologies, and secure car-to-car and car-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.

Mobility Service

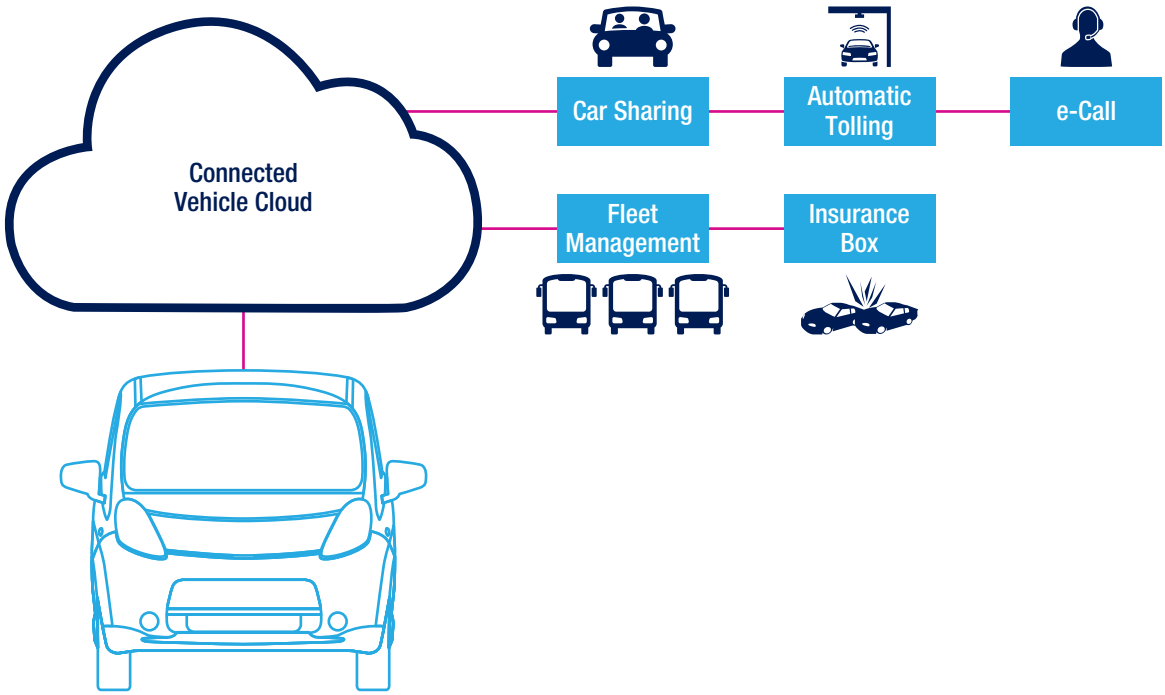
Mobility services are growing rapidly as vehicles become more connected. Powerful processing, vehicle connectivity and innovative sensors enable new possibilities for software service developers and a wealth of applications for car owners.

Car Safety enhancing services like "emergency call" in the event of an accident rely on sensors to detect an accident, on telematics processing and GNSS positioning to transmit the accident location, and on cameras to record the event and provide advance information to the arriving emergency services. Insurance boxes can record events prior to accidents but are also changing the market by enabling driver monitoring which provides data to customize tariffs on the driver's behavior.

Other mobility services range from fleet management, to car sharing, from free parking place detection to road tolling. All these services rely on automotive sensors, processing and communications semiconductors available from ST.

As the car evolves from a personal vehicle to a shared service provided by a fleet of driverless vehicles in a smart city environment the level of offered services will grow dramatically. ST's products are used in many advanced driving systems, and our proven record in secure connectivity and sensor technologies can serve as the platform on which Mobility services can be built.

KEY APPLICATIONS



SOLUTIONS

ST's key products and solutions for Mobility Services applications include:

GNSS	Bluetooth, NFC and Connectivity	Ultrafast and Schottky Diodes	Transceivers and Interfaces	Telematics Processors and 32-bit Automotive Microcontrollers
Audio Power Amplifier	Power Management	EOS and ESD Protection	Sensors	

HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors

Smart Driving

FIND OUT MORE

www.st.com/mobility-services

e-Call
Insurance Telematics Box
Fleet Management
Car Sharing
Automatic Tolling

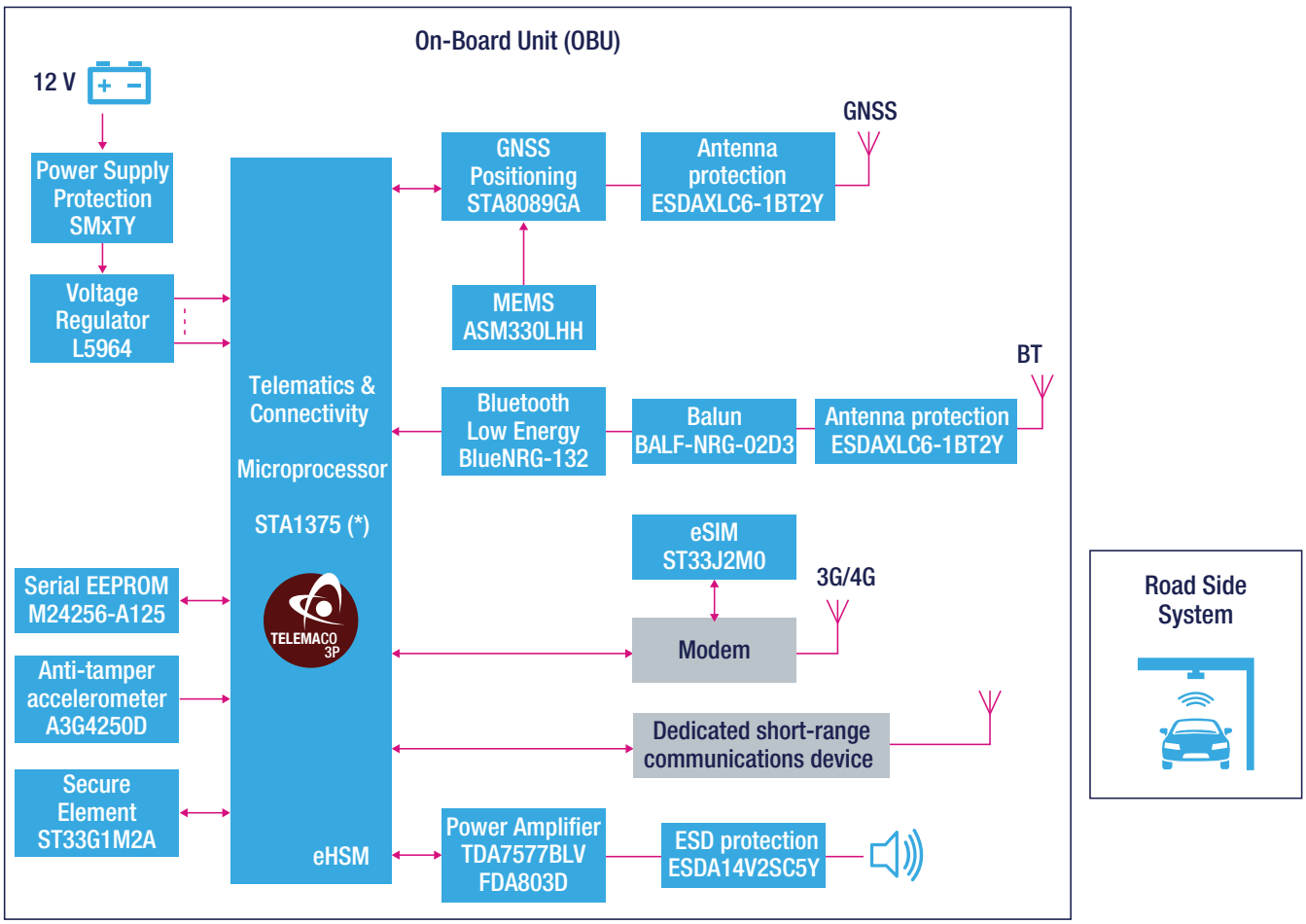
AUTOMATIC TOLLING SYSTEM

Originally conceived for highway access toll collection, automatic tolling systems are now enabling a growing range of digital payment services when accessing restricted areas, parking lots, toll bridges and other controlled areas, including zones subject to congestion charges or urban toll schemes.

The technology used for electronic toll collection (ETC) and open road tolling (ORT) systems relies on a dedicated short-range communication (DSRC) wireless data link between the vehicle and the toll gate that enables a secure identification and payment process.

ST supports developers build advanced automated tolling systems with an extensive range of dedicated wireless connectivity ICs, GNSS receivers and application processors, MEMS inertial sensors, and secure elements as well as highly secure smartcard and radio-frequency identification (RFID) tags and readers.

Automatic tolling



(*) With a modem embedding an application processor, an SPC58 Chorus 32-bit Automotive MCU can be used as option.

FIND OUT MORE

www.st.com/automatic-tolling-system

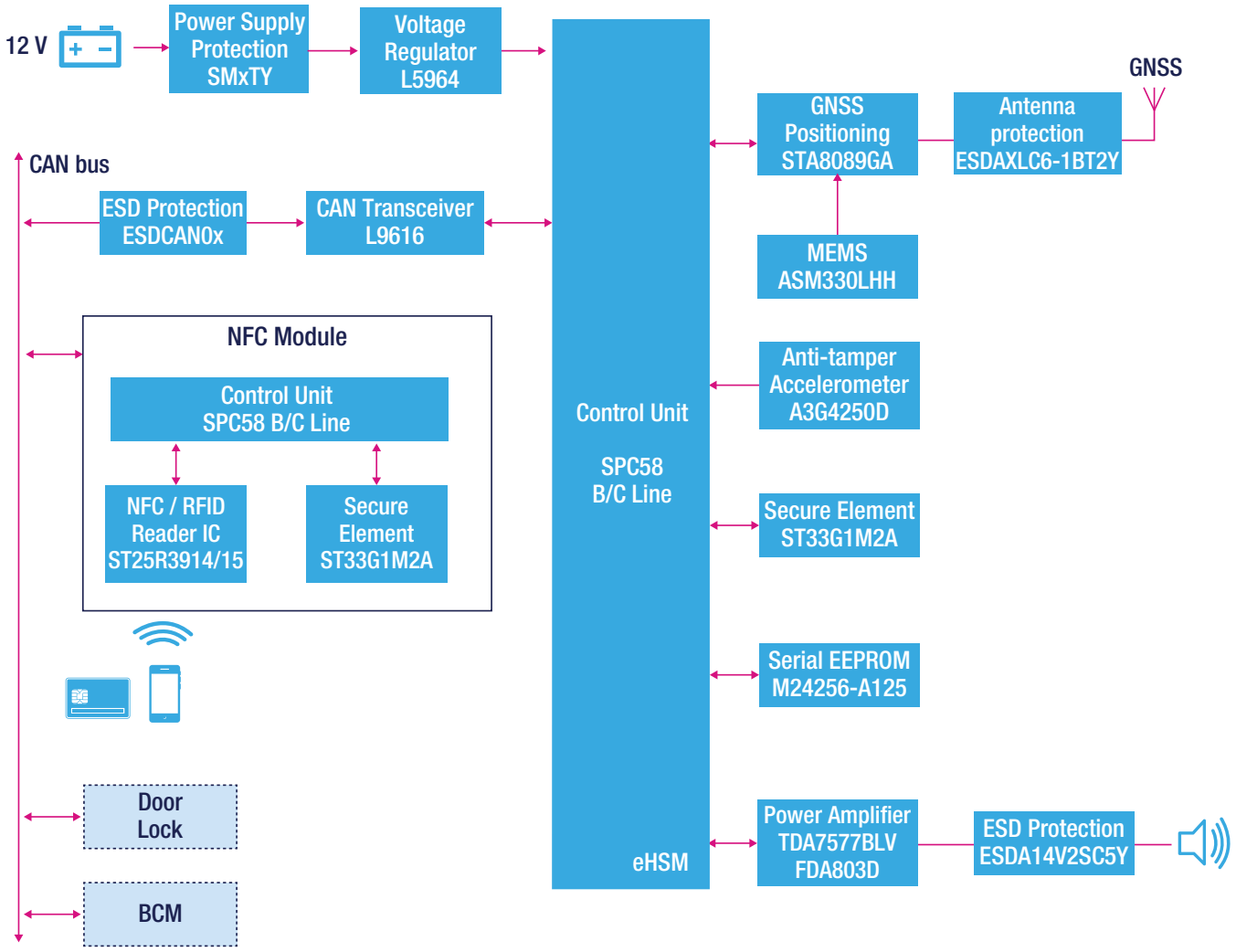
CAR SHARING ON-BOARD UNIT

Carsharing services enabling a pay-per-use access to individual vehicles are experiencing a growing pervasiveness as they can help users to enjoy a tailored experience that can optimize cost-of-ownership based on individual needs.

Companies providing this service need access to real-time information on each vehicle's position and status as well as the ability to verify user's rights in accessing the vehicle. Dedicated telematics systems are installed in each vehicle collect this wealth of information and make it available to the fleet manager.

ST's wide product portfolio can help build complete on-board unit solutions for shared vehicles with a range of automotive-grade NFC transceiver ICs for smart car access, SPC5 32-bit Power Architecture microcontrollers with embedded an hardware security module (HSM), secure elements, GNSS devices and Bluetooth connectivity ICs and MEMS inertial anti-tamper sensors.

Car Sharing On-board Unit



FIND OUT MORE

www.st.com/car-sharing-on-board-unit

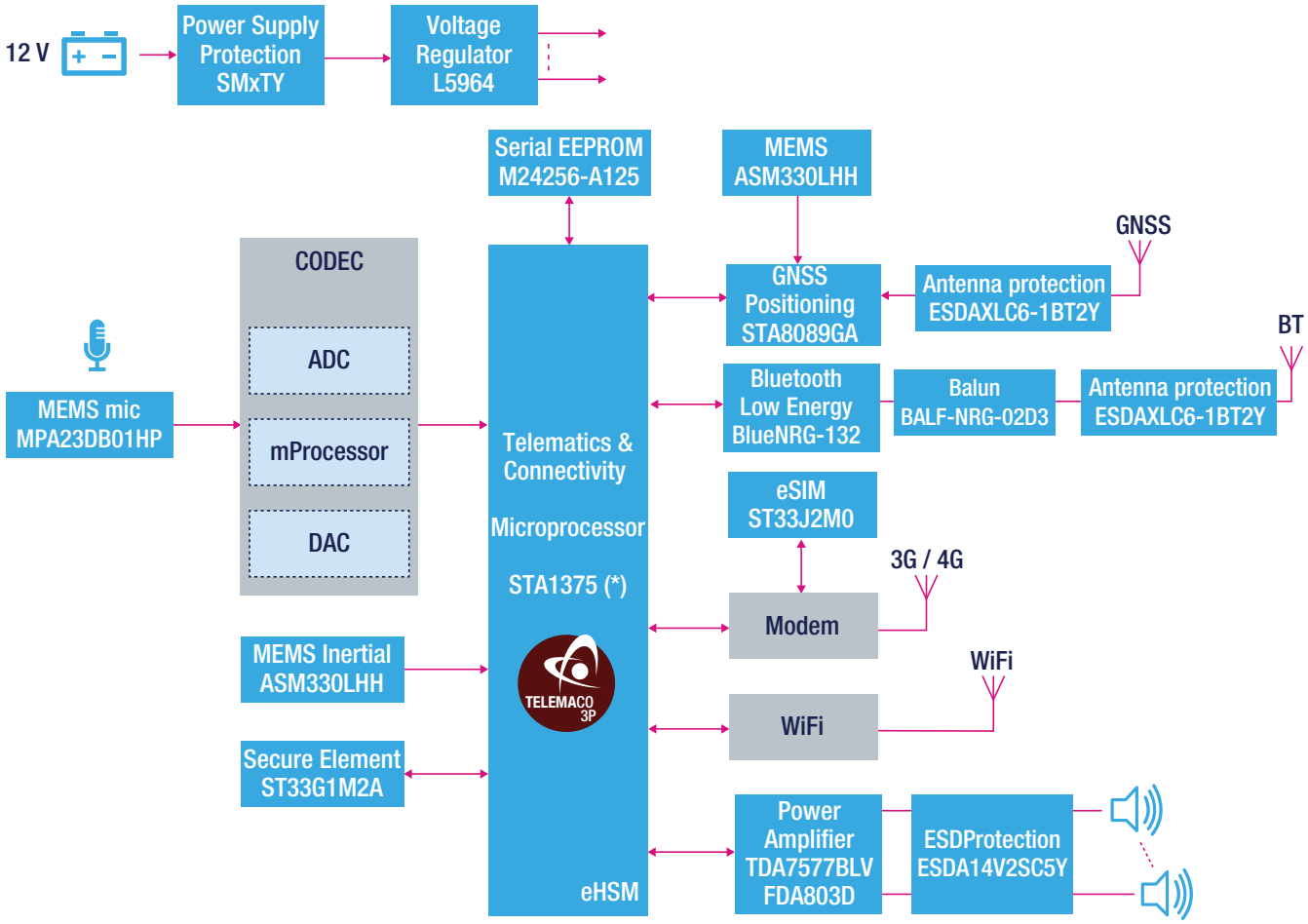
E-CALL

Governments and agencies worldwide are setting increasingly demanding and strict rules and policies to enhance the security of both drivers and passengers. This has led to the adoption of emergency call systems – or e-call systems – that can automatically alert first-responder services whenever an accident or car breakdown occurs.

To enable this service, vehicles will need to be equipped with a module that can sense fault conditions, provide localization, communication and a voice interface with the vehicle's occupants.

ST's portfolio includes automotive grade sensors, GNSS receivers and application processors to help design the modules required to enable in-car e-call systems.

e-Call



(*) With a modem embedding an application processor, an SPC58 Chorus 32-bit Automotive MCU can be used as option.

FIND OUT MORE

www.st.com/ecall

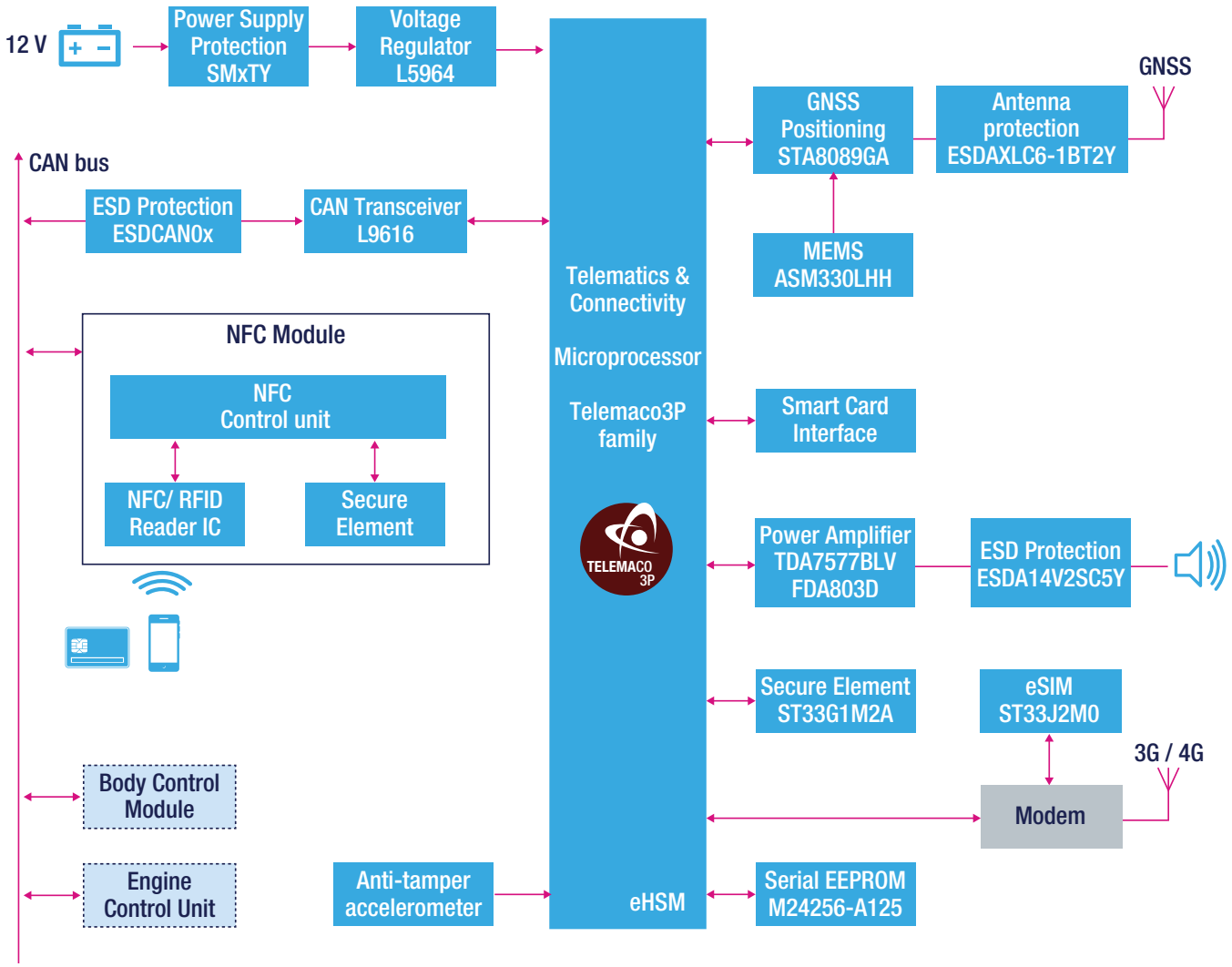
FLEET MANAGEMENT ON-BOARD UNIT

Companies owning or leasing vehicle fleets as well as fleet-management service providers need more advanced means than ever to access information about each vehicle's position and status in real-time in order to best monitor, track and deploy their vehicles.

Dedicated telematics systems installed in each vehicle collect this wealth of information and make it available to the fleet manager for scheduling maintenance and servicing tasks – to lower the risk of breakdown and help protect the investment – and to ensure user's rights in accessing the vehicle for use in remote vehicle disabling systems, for example.

ST's wide product portfolio can help build complete vehicle telematics systems for fleet management solutions with a range of automotive-grade NFC transceiver ICs for smart car access, application processors with embedded an hardware security module (HSM), secure elements, GNSS devices and Bluetooth connectivity ICs and MEMS inertial anti-tamper sensors.

Fleet Management On-board Unit



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FIND OUT MORE

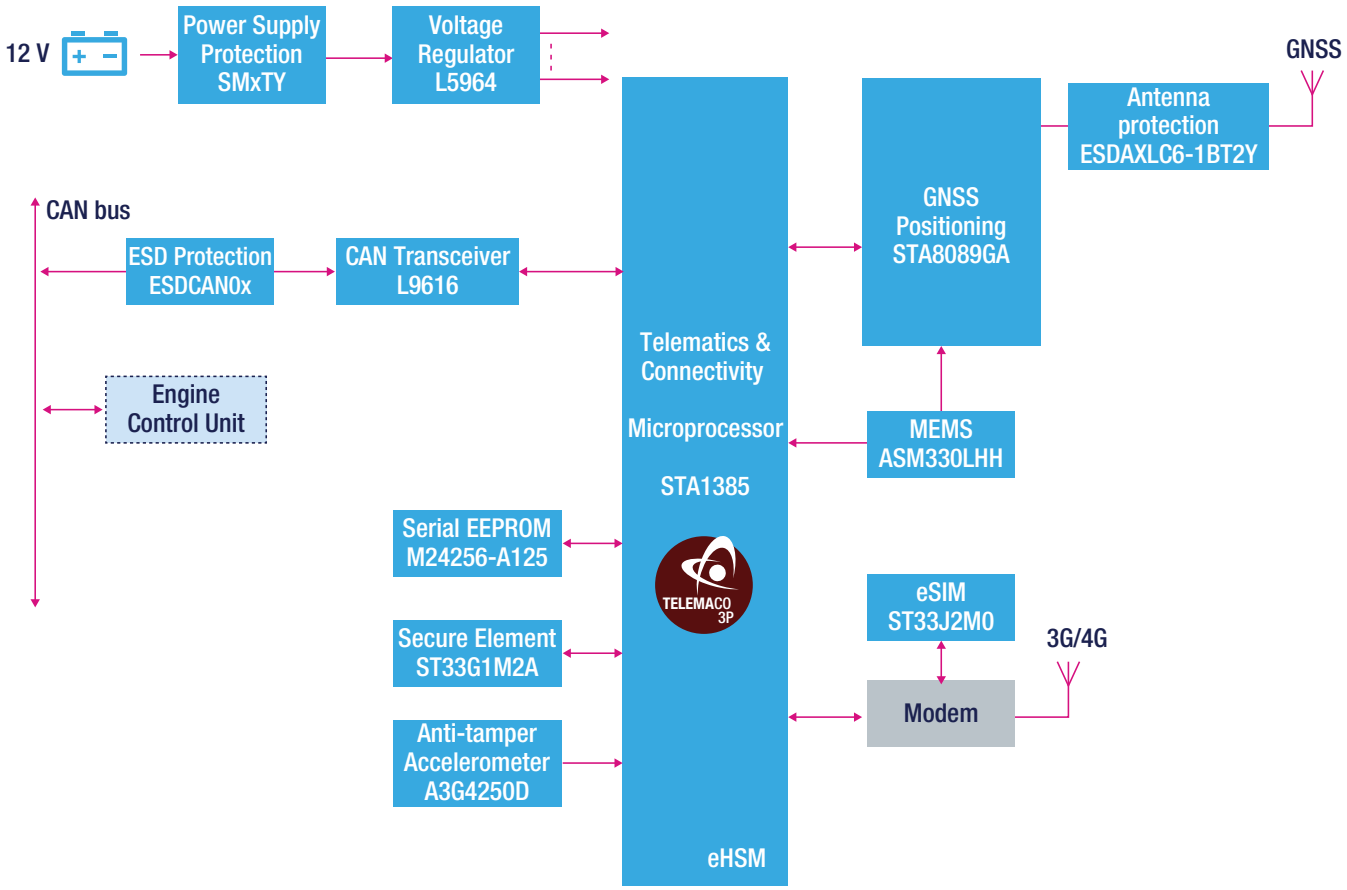
www.st.com/fleet-management-on-board-unit

TELEMATICS BOX

Companies are increasingly promoting the use of a telematics box – a black box that constantly monitors a vehicle's position, acceleration rate and speed. It can also detect collisions, help assess driver behavior and locate the vehicle in the event of theft. Insurance companies can also use this information to assess a driver's responsibility whenever an event that involves the driver's liability occurs. Drivers can benefit from more personalized insurance premiums, even on a pay-as-you-drive basis.

ST helps developers, designing vehicle telematics systems, with a range of solutions including application processors, the latest generation of global navigation satellite system (GNSS) ICs with reduced power consumption and carrier-phase tracking for higher positioning accuracy.

Telematics Box



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FIND OUT MORE

www.st.com/telematics-box

Development Tools

PRODUCT SELECTORS, SAMPLES, EVALUATION BOARDS

ST provides a set of Smart Selectors 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 provides schematics, BOM and Gerber files to facilitate your hardware design and demonstration software packages are available too.

Product Selectors

Rapidly find the most relevant automotive products for your designs.

Evaluation Boards

ST evaluation boards help you evaluate the features and performance of selected products and system solutions that demonstrate optimized and tested solutions for your application design.

SPC5 AUTOMOTIVE MCU EVALUATION TOOLS: EASIER EVALUATION AND FASTER DEVELOPMENT

A complete range of hardware evaluation and emulation tools supports the SPC5 family of automotive microcontrollers. Discovery and Premium development boards are available to support your development from preliminary evaluation through to advanced solution development.

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A full range of state-of-the-art tools and software from major third parties is also available for the SPC5 family of automotive microcontrollers.

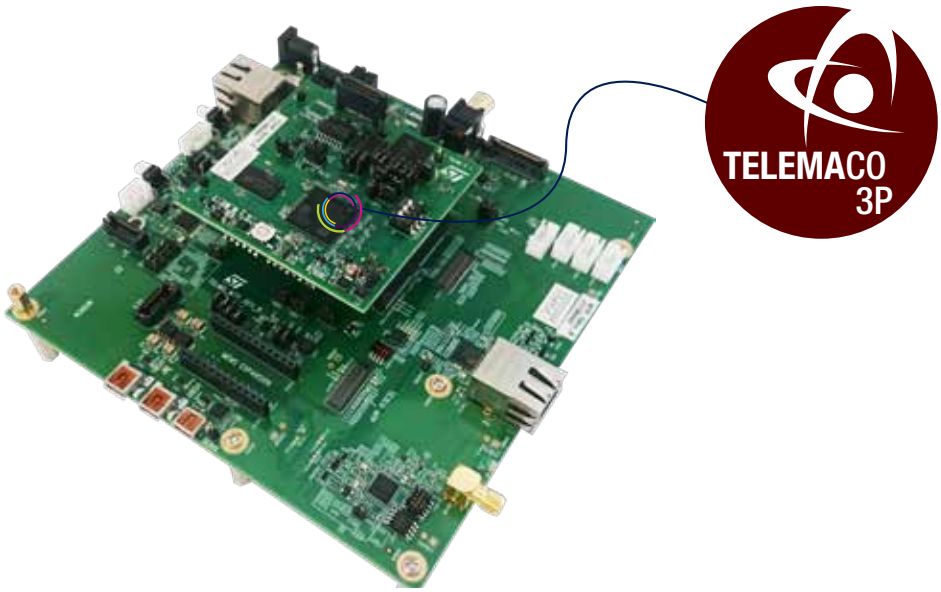
FIND OUT MORE

www.st.com/auto-sp5-mcu-evaltools

MODULAR TELEMATICS PLATFORM (MTP): OPEN DEVELOPMENT PLATFORM FOR SECURE CAR-CONNECTIVITY APPLICATIONS

ST Modular Telematics Platform (MTP) provides an open development environment for prototyping advanced Smart Driving applications, particularly those requiring secured vehicle connectivity to back-end servers, cloud services or road infrastructure. Its main central computing module is based on the recently unveiled Telemaco3P, the industry's first automotive processor to include a dedicated Hardware Security Module (HSM) providing state-of-the-art on-chip secrecy, authentication and cryptography. MTP also offers a comprehensive set of automotive-connectivity devices both on the board and in plug-in modules, ensuring development flexibility and extensibility.

MTP integrates ST's automotive-grade multi-constellation GNSS Teseo IC, with dead-reckoning sensors. Moreover, an optional on-board ST33 Secure Element is available to enhance the security of the platform further than the capabilities of Telemaco3P's embedded HSM. In addition, the platform supports connecting automotive buses such as CAN, FlexRay, and BroadR-Reach® (100Base-T1) to the board directly, while optional Bluetooth™ low energy, Wi-Fi, and LTE modules offer access to wireless networks.
Designed for advanced automotive telematics use cases including remote diagnostics and secure Electronic-Control-Unit (ECU) Firmware Over The Air (FOTA) updating, the MTP includes extension connectors for V2X and precise positioning modules too.
On top of this extensive hardware offering, the MTP Quick Start Package and the Board Support Package (BSP) based on open source Linux, FreeRTOS, and Yocto complete the package to enable agile solution prototyping.



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Solutions for Smarter Driving
Chassis and Safety

Content

Smart Driving

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

SAFER

Driving is safer thanks to our Advanced Driver Assistance Systems (ADAS) products – 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 units engine management systems, high-efficiency smart power electronics at the heart of all automotive sub-systems and Silicon Carbide devices for hybrid and electric vehicle applications.

MORE CONNECTED

And vehicles are more connected using our infotainment-system and telematics processors and sensors, as well as our radio tuners and amplifiers, positioning technologies, and secure car-to-car and car-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.

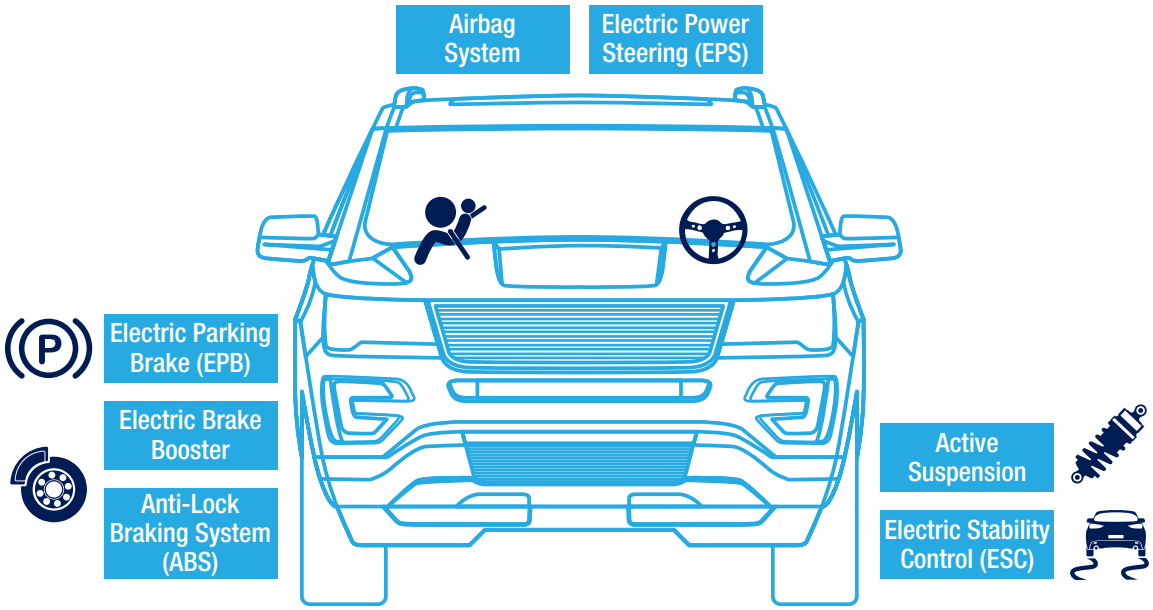
Chassis and Safety

Active and passive safety systems that reduce the risk of accidents as well as their consequences are becoming more sophisticated with an increasing electronic component count.

Active safety applications such as electric power steering, electric parking brakes, active suspension, Anti-lock Braking Systems (ABS) increasing rely on sensors, brushed and brushless motors and microcontrollers to improve performance and reliability. Passive applications like seat-belt tensioners and airbags also benefit from the latest technology.

ST offers a range of both standard and dedicated devices to enable all these chassis and safety applications. These include standard low-side, high-side, bridge and pre-drivers, Smart Power devices for driving solenoids, brushed, brushless and stepper motors; dedicated ICs for actuator driving and one of the industry's broadest ranges of Power MOSFETs. We also supply System Basis Chips (SBC) for fully integrated smart-power solutions, MEMS accelerometers and gyroscopes, and powerful 32-bit automotive microcontrollers to provide reliable control.

KEY APPLICATIONS



SOLUTIONS

ST's key products and solutions for Chassis and Safety applications include:

VIPower and BCD Actuators and Motor Control	Braking & Airbag Dedicated ICs	Power Management	EOS and ESD Protection	32-bit Automotive Microcontrollers
	Power Diode, MOSFET & IGBT	Transceivers and Signal Conditioning	Sensor Interfaces	
HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors				

Smart Driving

FIND OUT MORE

www.st.com/chassis-and-safety

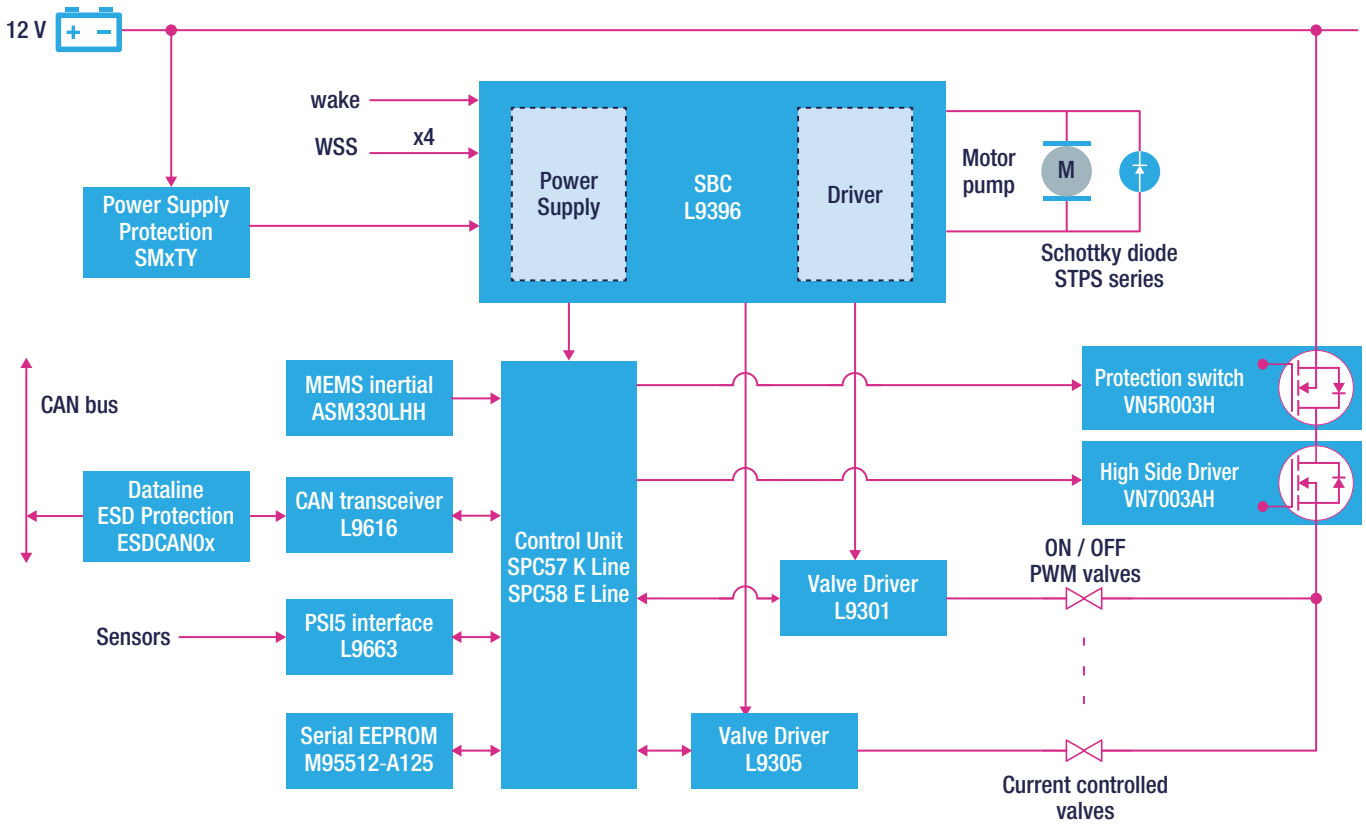
Electric Power Steering
Electric Parking Brake
Electric Brake Booster
Belt Tensioner

Airbag System
Active Suspension
ABS and ESC

ANTILOCK BRAKING SYSTEM (ABS)

Anti-lock Braking Systems (ABS) are today a standard safety feature in any passenger road vehicle, even in entry level cars designed for emerging markets.

To support manufacturers meet their design targets, we have an extremely wide offer that includes SPC5 32-bit automotive microcontrollers, dedicated valve drivers and highly optimized System Basis Chips (SBC).



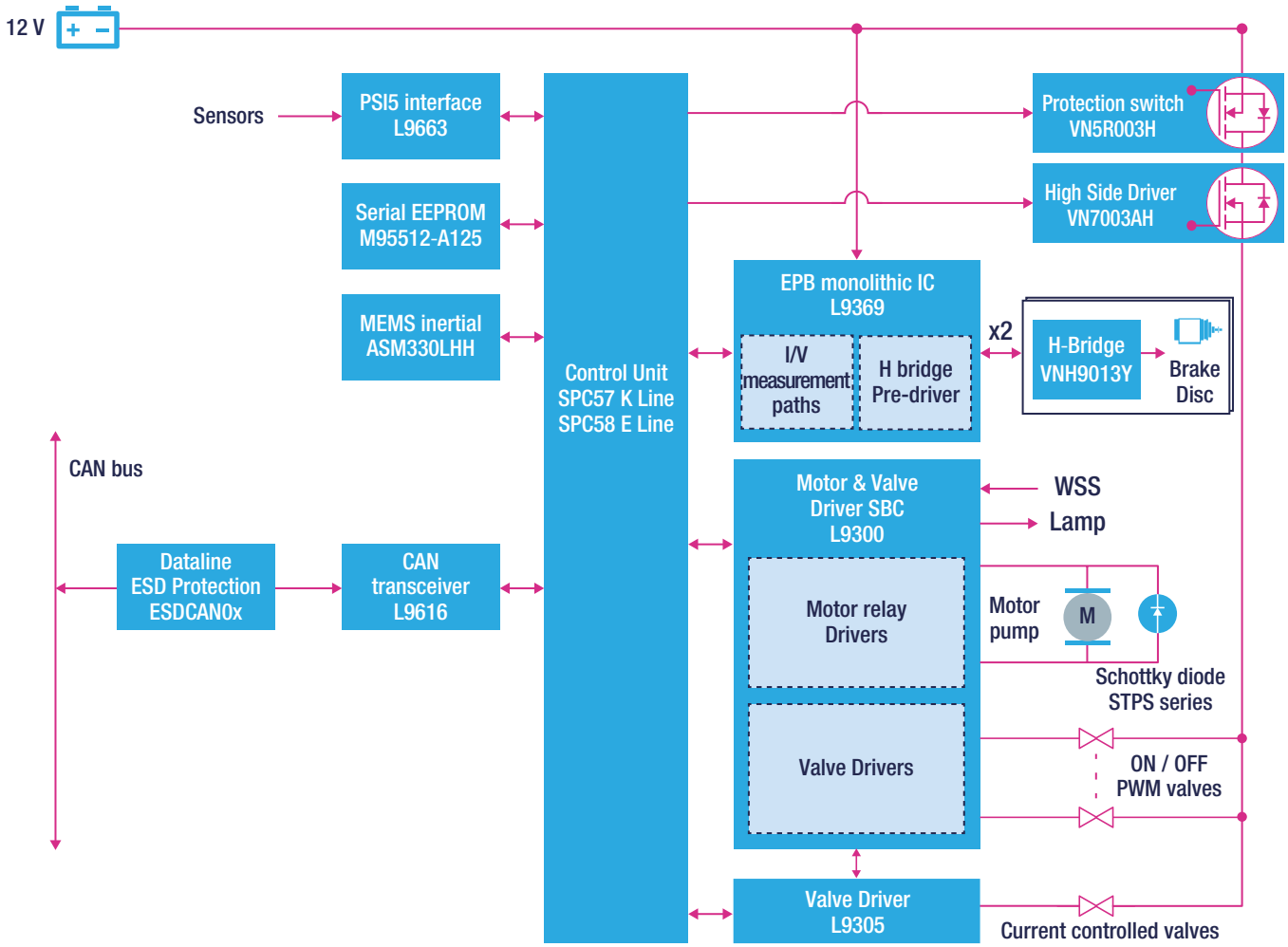
FIND OUT MORE

www.st.com/abs

ELECTRIC STABILITY CONTROL (ESC)

Electric Stability Control (ESC) systems are designed to detect and reduce loss of traction to prevent skidding. By applying the brakes to the vehicle's wheels individually, ESC systems counter over- and under-steering to help ensure the comfort and safety of drivers and passengers. This proven technology is increasingly being included as a standard feature in many vehicles.

ST's solutions for ESC include a full range of three-phase gate drivers and Power MOSFETs for driving BLDC motors, including 48 V domains. Dedicated power management ICs, and CAN transceivers as well as a wide range of flexible and innovative Application-Specific Standard Products (ASSP), covering all possible system partitions. SPC5 32-bit automotive microcontrollers provide the overall system control.



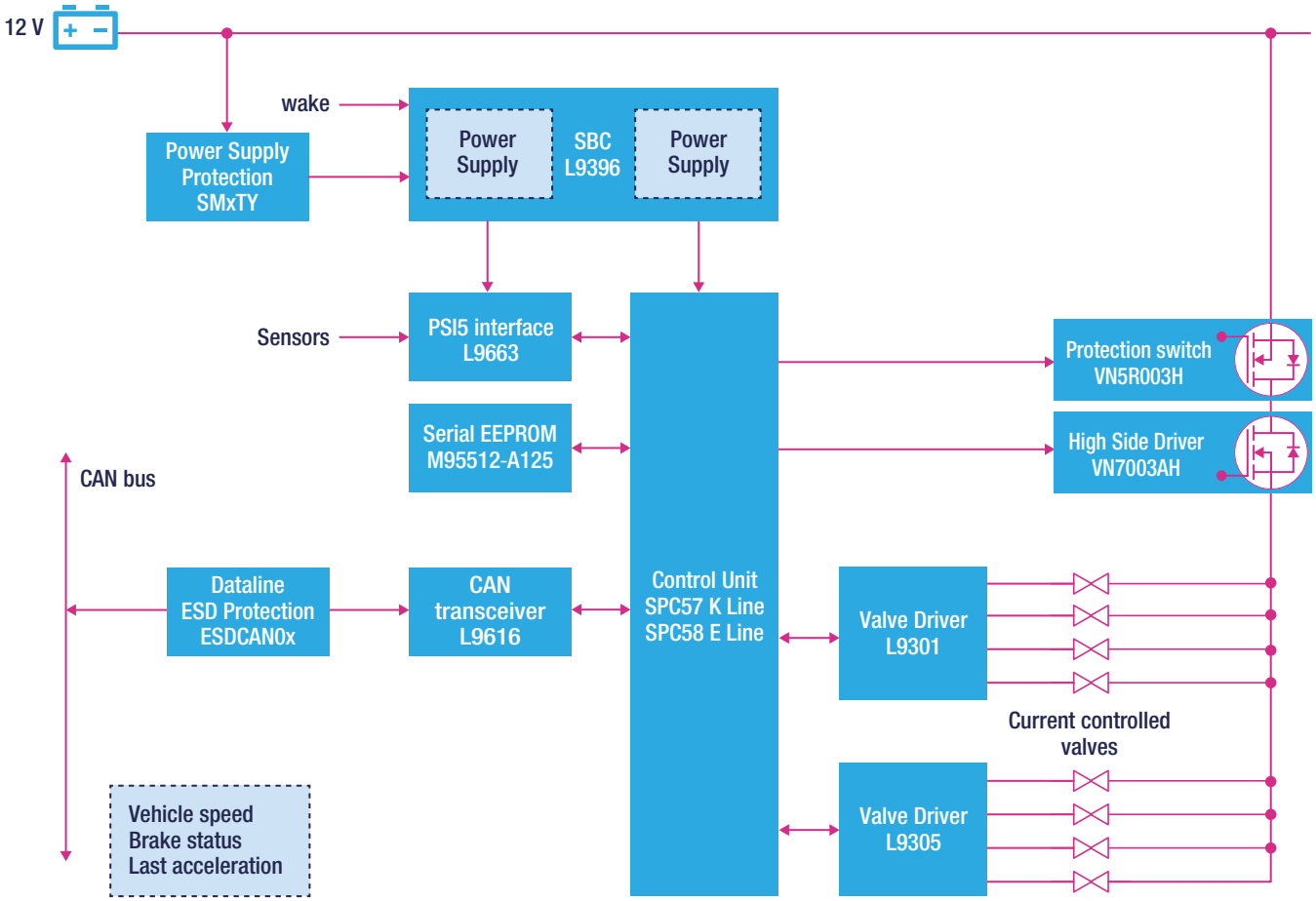
FIND OUT MORE

www.st.com/electronic-stability-control

ACTIVE SUSPENSION

An advanced technology that enhances comfort for drivers and passengers while allowing carmakers to define an engaging driving experience. Found in Premium cars, they require a wide range of semiconductor content for their implementation.

ST has an extremely wide offer that includes SPC5 32-bit automotive microcontrollers, dedicated valve drivers, CAN transceivers and highly optimized System Basis Chips (SBC).



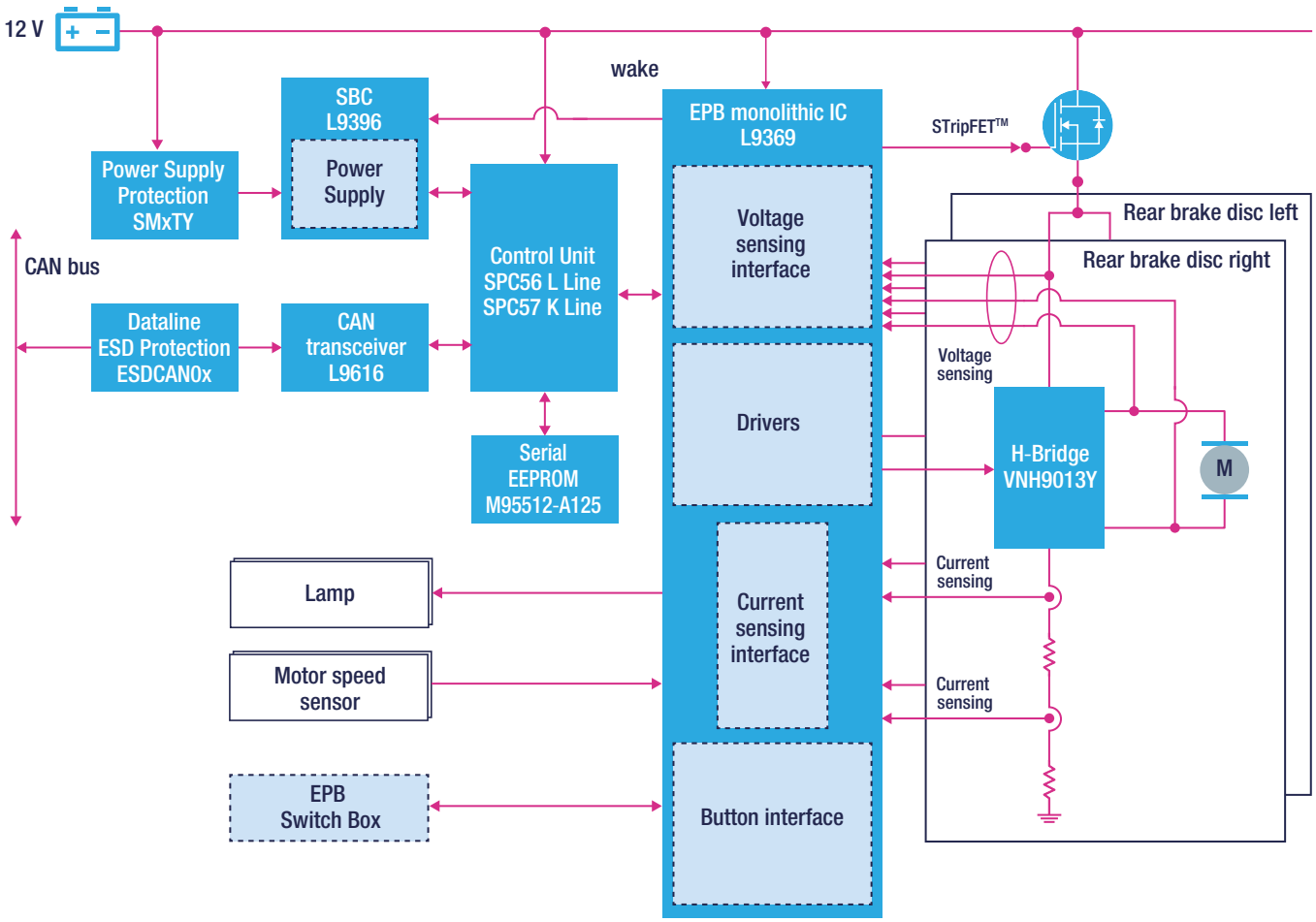
FIND OUT MORE

www.st.com/active-suspension

ELECTRIC PARKING BRAKE (EPB)

Providing an additional level of safety in today's vehicles, Electric Parking Brake (EPB) systems also improve the driver convenience by ensuring driver-assist functions including automatic brake release when moving off and a hill-hold function for incline starts.

ST's offer includes SPC5 32-bit automotive microcontrollers, H-bridge drivers, CAN transceivers and highly optimized System Basis Chips (SBC) which will help designers achieve their reliability and cost targets for these systems.



FIND OUT MORE

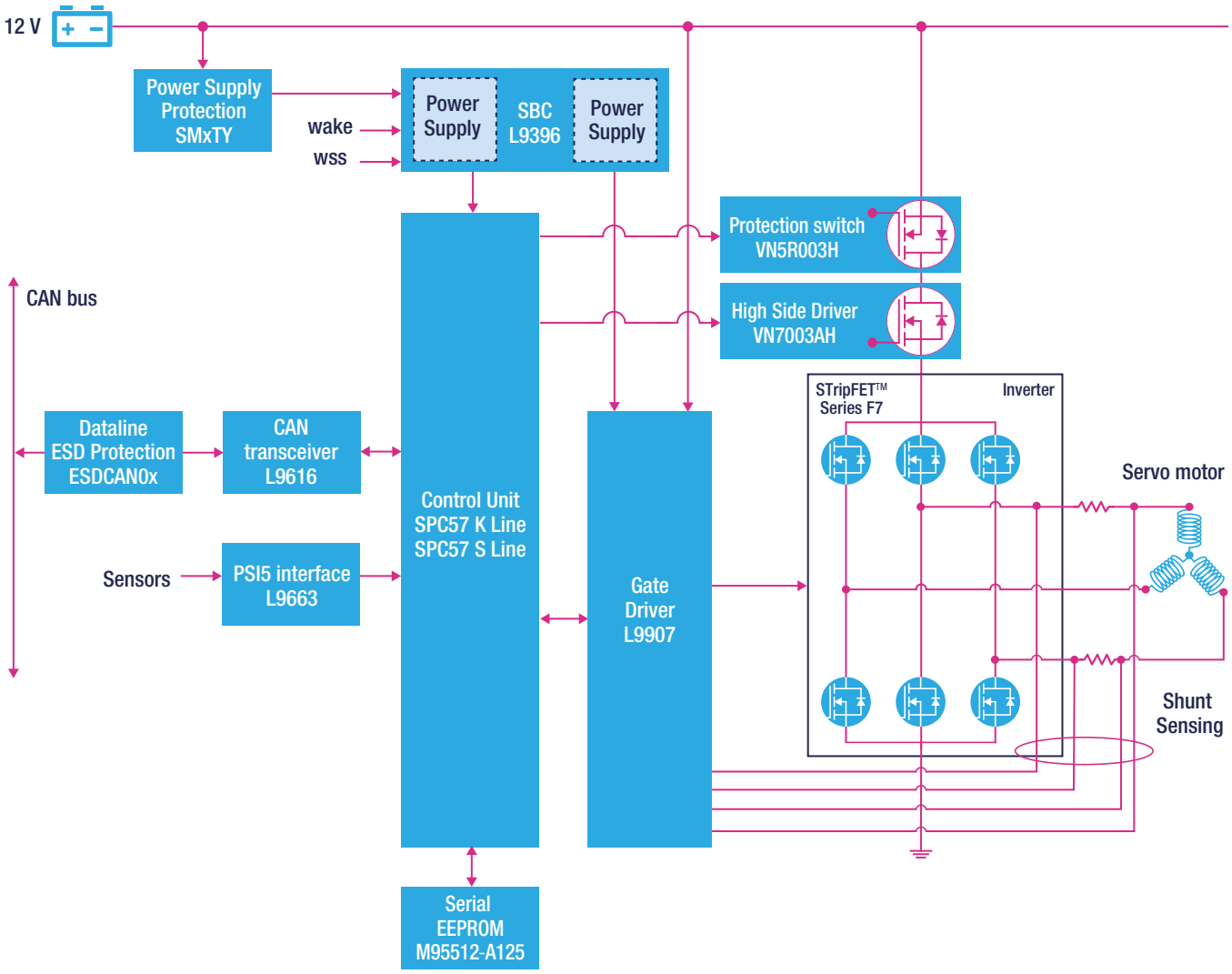
www.st.com/electric-parking-brake

ELECTRIC POWER STEERING (EPS)

By assisting driver effort in controlling a vehicle's steering wheel, Electric Power Steering (EPS) systems improve directional control and passenger safety while reducing engine loading, thus improving fuel efficiency.

Electric Power Steering (EPS) systems use an electric motor – typically a three-phase brushless DC (BLDC) motor – to replace the hydraulic actuation mechanism. An EPS can improve the driver's directional control of the vehicle and reduce engine loading, thus improving its fuel efficiency. It also enables variable-assist power steering where the level of assistance is greater at lower speeds when it is needed most and reduced at higher speeds.

ST's solutions for EPS include a full range of three-phase gate drivers and Power MOSFETs for driving BLDC motors, including 48 V domains. Dedicated power management ICs, and CAN transceivers as well as a wide range of flexible and innovative Application-Specific Standard Products (ASSP), covering all possible system partitions. SPC5 32-bit automotive microcontrollers provide the overall system control.



FIND OUT MORE

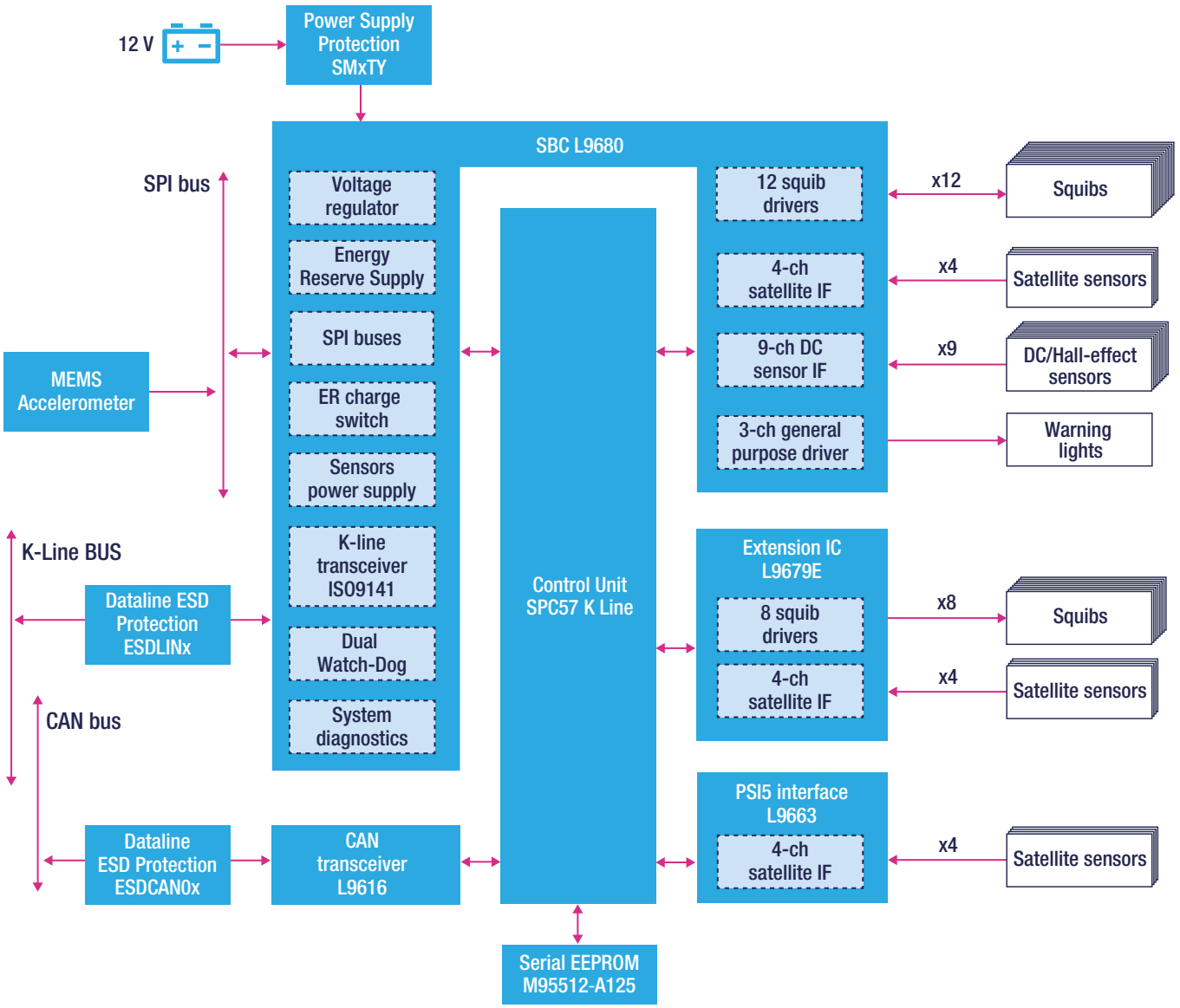
www.st.com/electric-power-steering

AIRBAG SYSTEM

As concern and legislation for driver and passenger safety continues to increase, airbags have become a standard feature in motor vehicles from small city cars to luxury SUVs.

Automakers need a range of scalable solutions that are feature- and cost-optimized – yet meet the highest reliability standards – for the different models in their range - from entry-level vehicles to extremely complex solutions, with an increasing number of squib ICs (for airbag deployment) and acceleration satellite sensors (intelligent crash sensors), to provide extensive features for Premium vehicles.

Our offer includes SPC5 32-bit automotive microcontrollers, power supply modules, efficient boost and buck converters, accurate ADC voltage references and highly optimized System Basis Chips (SBC).
We also have squib drivers with relative diagnostics and programmable deployment profiles and PSI5 satellite sensor interfaces.



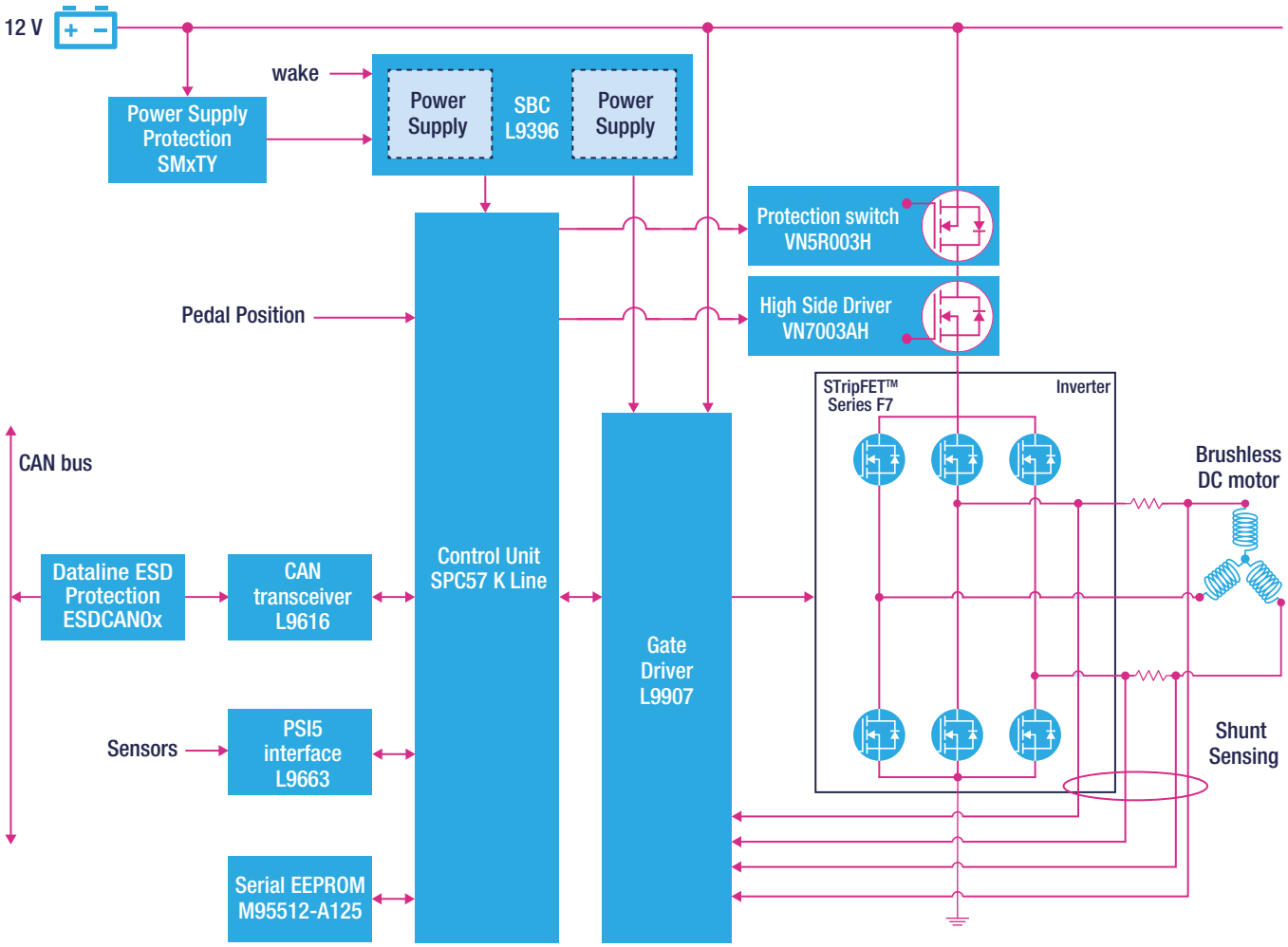
FIND OUT MORE

www.st.com/airbag-system

ELECTRIC BRAKE BOOSTER

Designed to reduce the amount of pedal pressure needed for braking, electric brake boosters, which use a sensor in the brake pedal to read a driver's actions, are progressively replacing mechanical vacuum brake booster systems.

Increasingly used by carmakers to enhance driver comfort and passenger safety, these electric brake boosters use a dedicated electronic system to process the signals from the brake pedal and operate the master cylinder by means of a brushless DC (BLDC) motor.



FIND OUT MORE

www.st.com/electric-brake-booster

Key Technologies

RESEARCH & DEVELOPMENT AND MANUFACTURING

To keep its technology edge, ST maintains a strong commitment to innovation, with approximately 7,400 people working in R&D and product design and spending about 16% of its revenue in R&D. Among the industry's global technology leaders, ST owns and continuously refreshes a substantial patent library (~17,000 patents; ~9,500 patent families and ~500 new patent filings per year).

The Company 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), Silicon Carbide (SiC), VIPower™, and MEMS technologies.

ST believes in the benefits of owning manufacturing facilities and operating them in close proximity and coordination with its R&D operations. ST has a worldwide network of front-end (wafer fabrication) and back-end (assembly,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.

VIPOWER™

VIPower™ is a technology developed by ST and in production since 1991. Vertical Intelligent Power technologies provide 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-Mixed design.

VIPower™ technology is the perfect choice for the control of automotive exterior and interior lighting, DC motors for seat adjustment, door locks and window lifts, resistive heaters and any kind of power load that needs control and sensing as well as power. VIPower™ products are replacing a host of electro-mechanical solutions, and providing lower power, lower chip count and lower pin-count solutions.

VIPower™ technology will play 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 ECUs microcontroller.

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: improvement 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.

BCD technology is used widely in the automotive industry and products are found in active suspension, braking, transmission, airbag, car audio and notably engine management and charging applications. A key engine management application is for fully integrated System-on-Chip solutions for CO_2 reducing Gasoline Direct Injection (GDI) systems. For EV charging BCD is ideal for Battery Management Systems (BMS).

Development Tools

PRODUCT SELECTORS, SAMPLES, EVALUATION BOARDS

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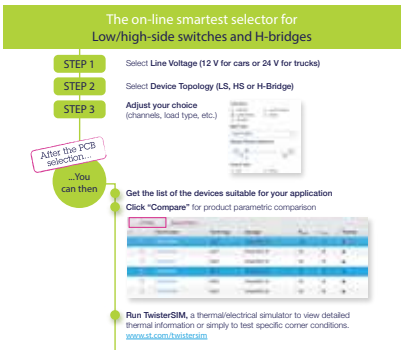
VIPower™ Smart Selector

VIPower's Smart Selector is designed to help and assist users to choose the best VIPower™ high/low-side switch or H-bridge device for their Automotive application.
All you need to do is select a few parameters related to your specific application, and the selector provides the relevant device. Parameters include nominal voltage (12 V for automotive cars or 24 V for trucks), a topology (high-side, low-side or h-bridge), the number of channels and type of load to drive (bulbs, motors, etc.). The selection can be further refined by setting source type (DC or PWM), temperature and PCB type.



FIND OUT MORE

www.st.com/vipower-smartselector

VIPower-FINDER

VIPower smart product finder application for Android and iOS

VIPower-FINDER is the application available for Android™ and iOS™ that allows you to explore the ST VIPower product portfolio using portable devices. You can easily define the device that best fits your application using the Smart or the parametric search engine. You can also find your product thanks to the efficient part number search engine.

Key Features
- Smart, parametric or part number search capability for product
- Technical datasheet downloading and off-line consulting
- Ability to share technical documentation via social media or via email
- Available on Android™ and iOS™ app stores

FIND OUT MORE

www.st.com/vipower-finder

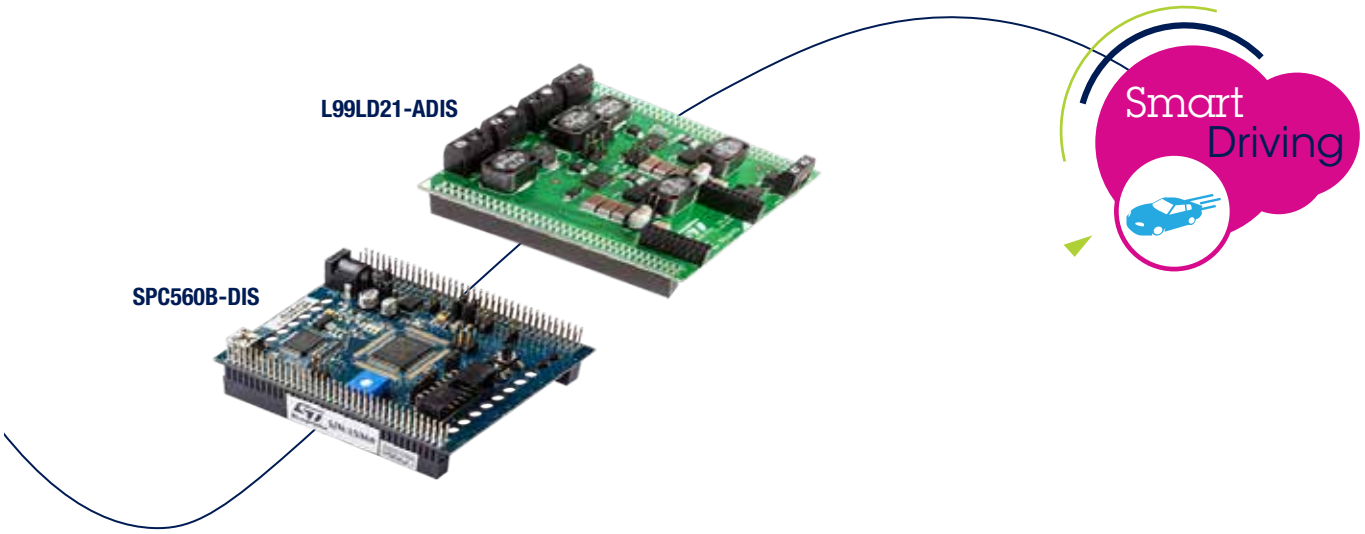
Easyboards

The Easyboard concept was created to give customers the chance to evaluate products without committing to the expense, time and resources typically needed to design a custom circuit board. Easyboards are simple and low-cost evaluation tools that connect a VIPower™ product to a load. This allows a straightforward evaluation of the device and of all the application functionalities, including the auto-protection capability for hazardous conditions. Each evaluation board includes a VIPower™ device soldered onto a small 2-layer PCB with heavy copper and thermal vias, to support maximum device current and customer-configured thermal relief strategies.
Easyboards come with the following part numbers:

- EV-VNx7xxx: VIPower M0-7 High Side Switches single, dual and quad channels for 12 V battery lines
- EV-VNx5Txxx: High Side Switches for 24V systems
- EV-VNH7xxx: Motor Control solutions

FIND OUT MORE

www.st.com/automotive-evalboards



Dynamic Electro-Thermal simulator for devices in VIPower technology

TwisterSIM is a unique electro-thermal simulator that helps shorten the design solution cycle by enabling, in a few clicks, complex engineering evaluations with accurate simulations like loadcompatibility, wiring harness optimization, fault condition impact analysis, diagnostic behavior analysis and dynamic thermal performance.

A built-in Interactive selector provides a short list of suitable devices based on first level system requirements. It assists you in detailing your actual system configuration with layout, load and driving profile customization to build an accurate model of the final application.

TwisterSIM supports a large selection of Low/High-side driver/switches and H-bridges for Motor Control.

FIND OUT MORE

www.st.com/twistersim

SPC5 AUTOMOTIVE MCU EVALUATION TOOLS: EASIER EVALUATION AND FASTER DEVELOPMENT

A complete range of hardware evaluation and emulation tools supports the SPC5 family of automotive microcontrollers. Discovery and Premium development boards are available to support your development from preliminary evaluation through to advanced solution development.

ST Discovery boards, available for each product line, enable a quick and easy way to evaluate the microcontroller's main features. The expansion connector makes it easy to plug in application and extension modules for rapid prototyping.

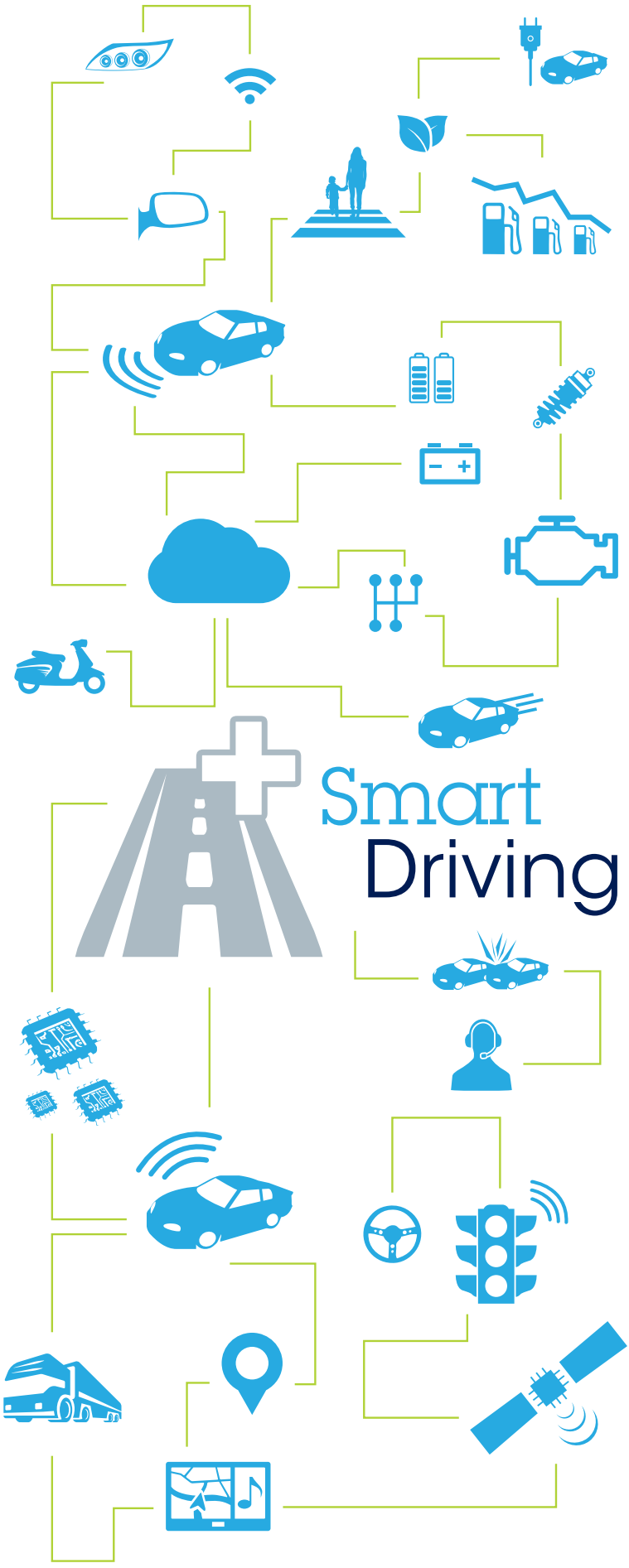
ST Premium boards, available for all lines and packages, provide user access to the device's complete feature set and functionalities for advanced development. The SPC5 motherboards, used in combination with adapters, enable full access to all of the MCU's signals and peripherals (such as CAN, SPI, LIN, FlexRAY and Ethernet).

The offer is complemented by a series of emulation solutions for high-speed tracing, monitoring and bypassing.

A full range of state-of-the-art tools and software from major third parties is also available for the SPC5 family of automotive microcontrollers.

FIND OUT MORE

www.st.com/auto-sp5-mcu-evaltools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