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Automotive Solutions for Chassis and Safety



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Smart Mobility

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

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

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



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

SAFER

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

GREENER

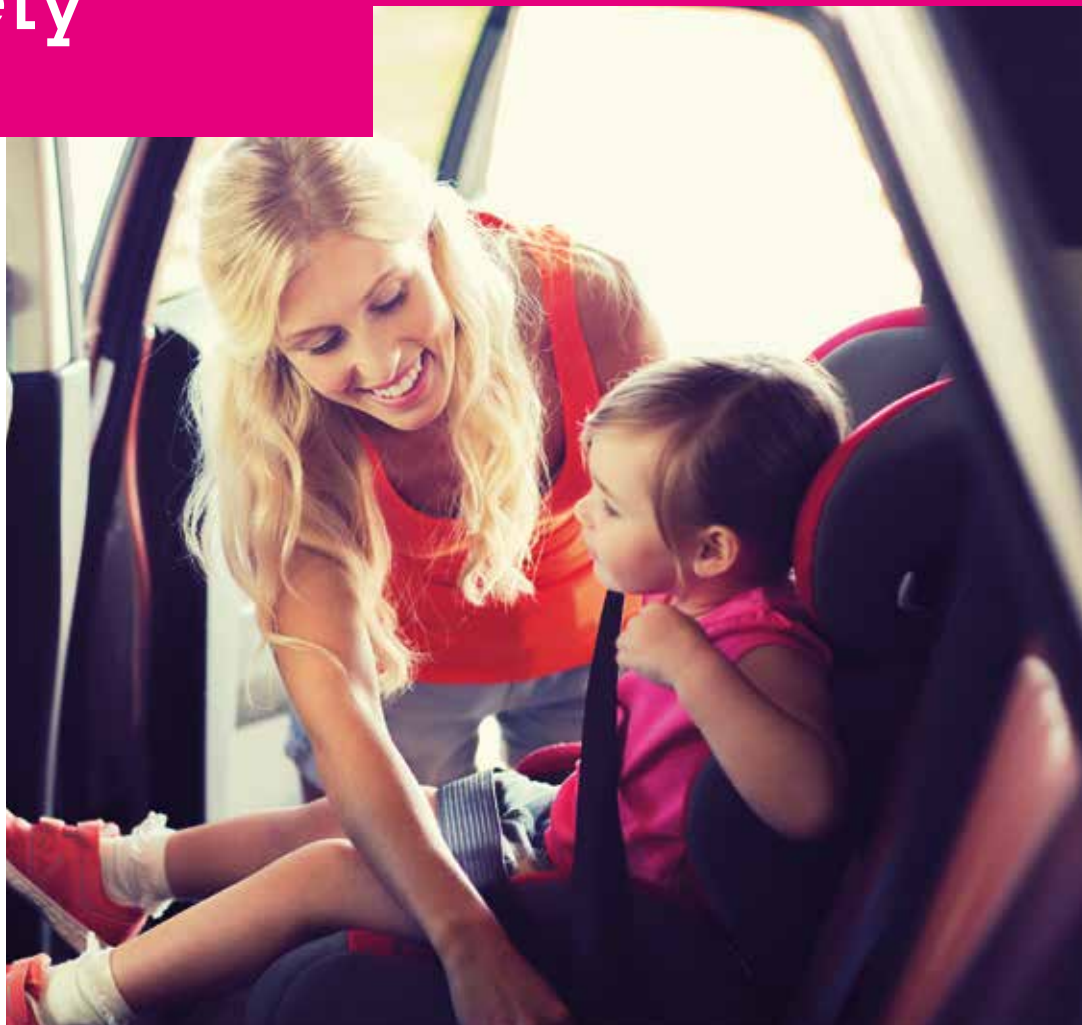
Driving is greener with our automotive processors for engine management units, engine management systems, high-efficiency smart power electronics at the heart of all automotive sub-systems and devices for hybrid and electric vehicle applications.

MORE CONNECTED

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



ST

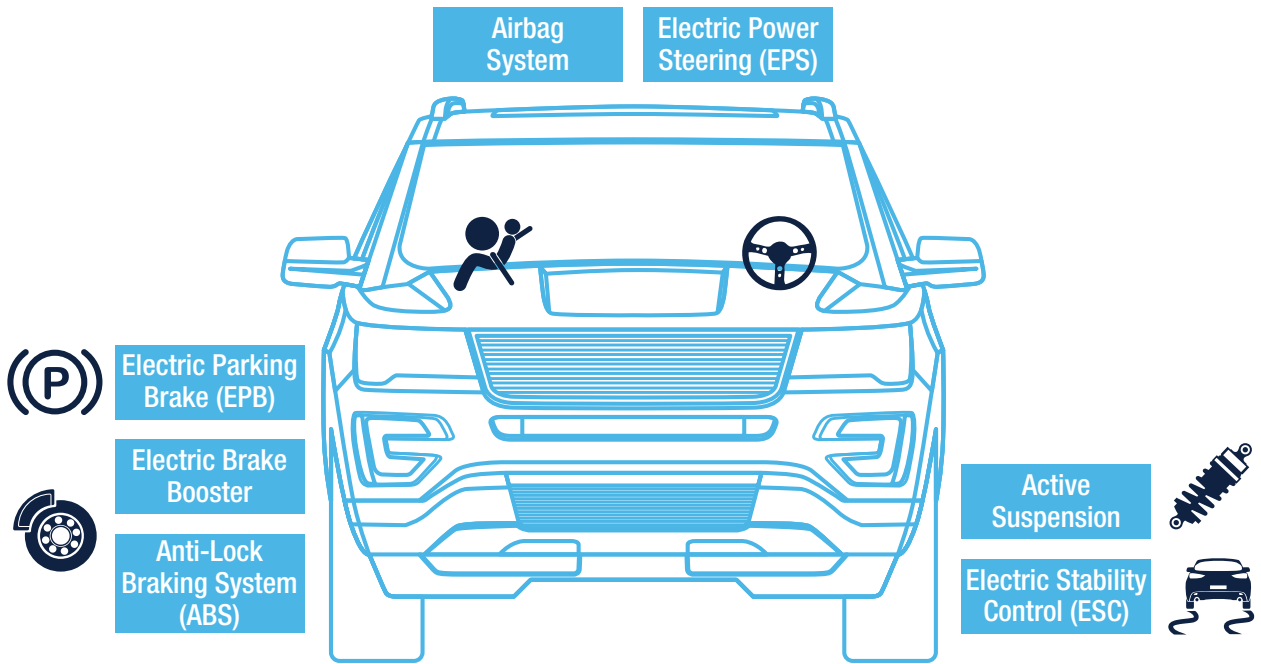
offers a range of both standard and dedicated devices to enable all chassis and safety applications

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, increasingly 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.

ST offers a range of both standard and dedicated devices to enable all these chassis and safety applications. In addition to standard low-side, high-side, bridge and pre-drivers, ST offers 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



FIND OUT MORE

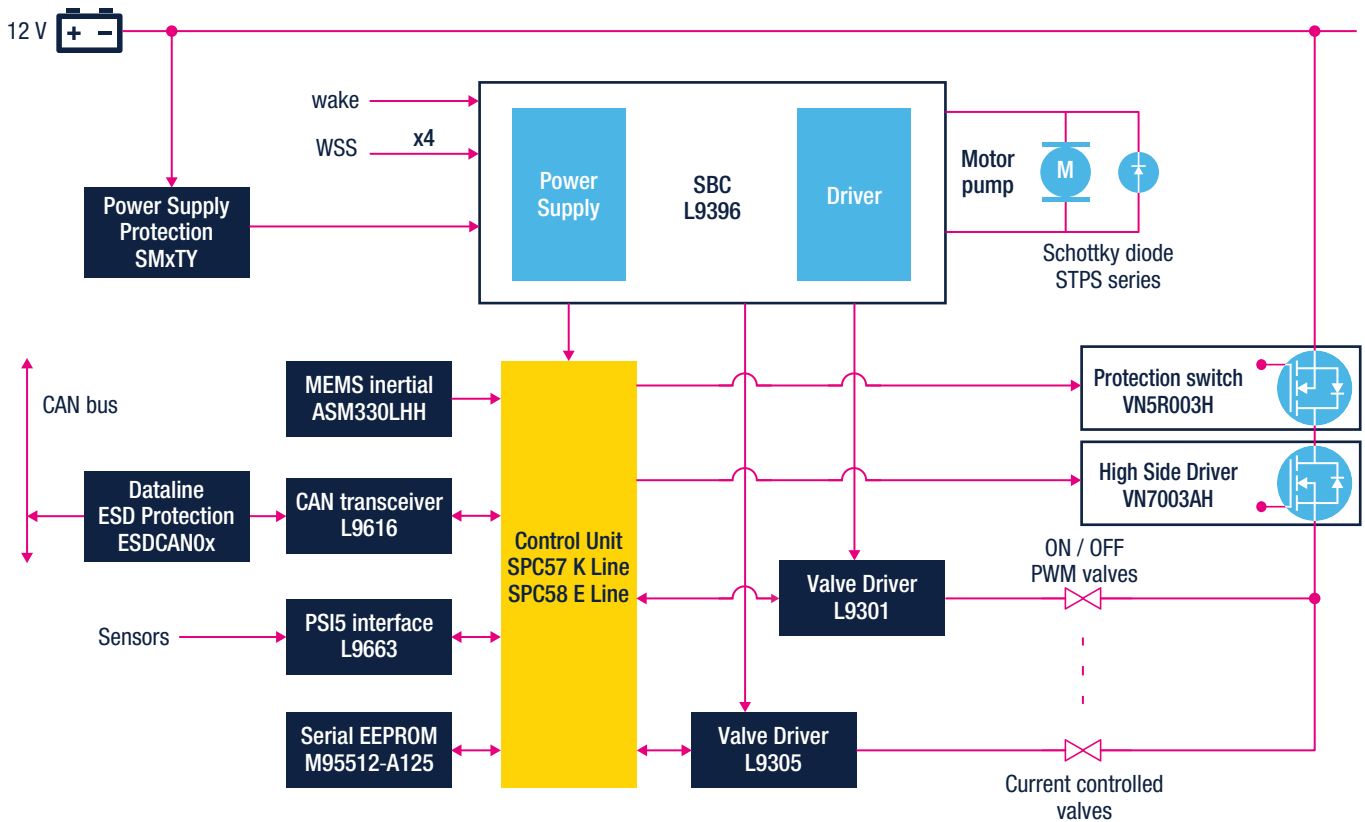
www.st.com/chassis-and-safety
 Electric Power Steering
 Electric Parking Brake
 Electric Brake Booster

Belt Tensioner
 Airbag System
 Active Suspension
 ABS and ESC

ANTI-LOCK 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 help 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).



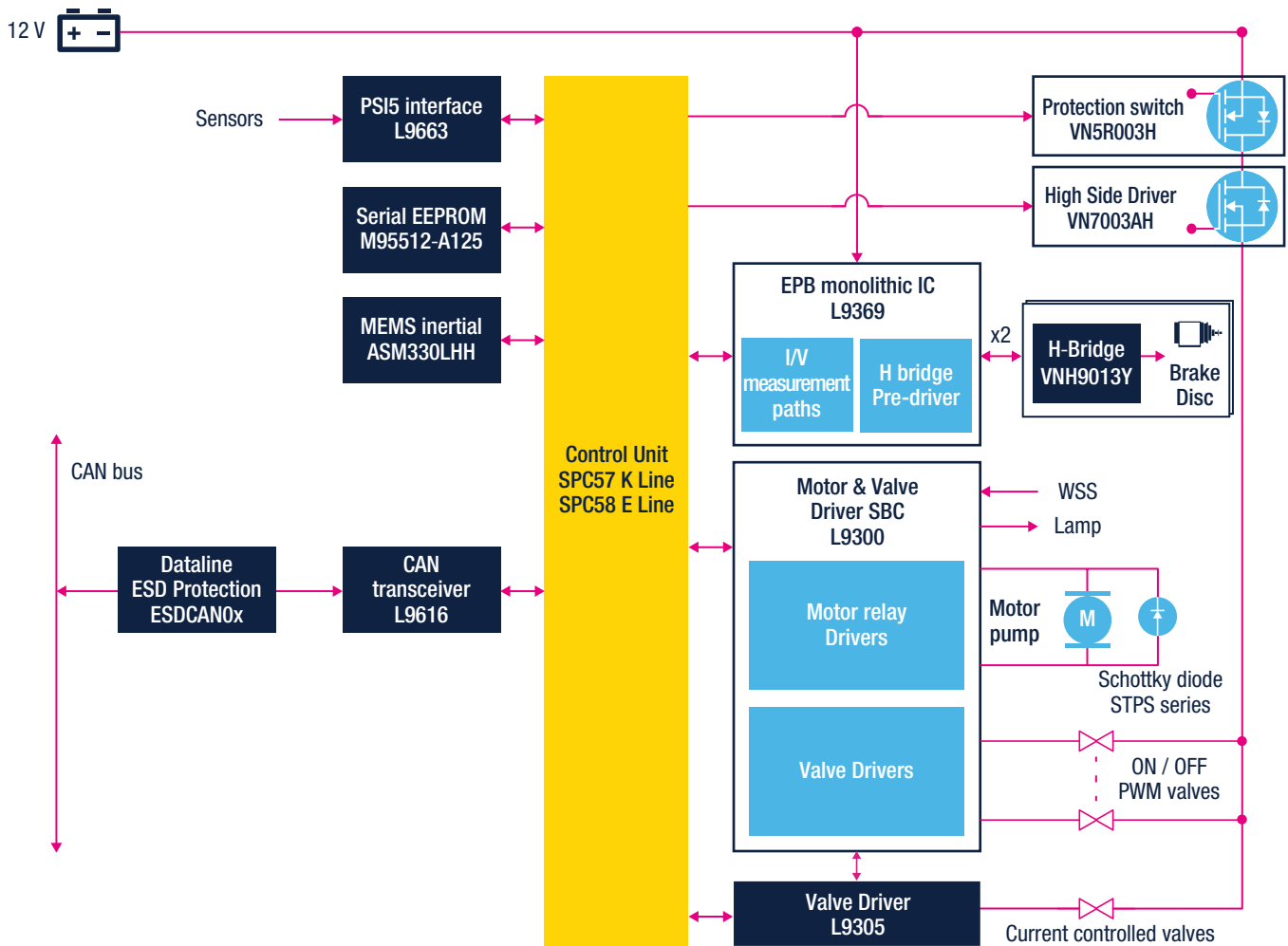
FIND OUT MORE

www.st.com/abs

ELECTRONIC STABILITY CONTROL (ESC)

Electronic 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 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 48V domains. Dedicated power management ICs and CAN transceivers as well as a wide range of flexible and innovative Application-Specific Standard Products (ASSP), cover all possible system partitions. SPC5 32-bit automotive microcontrollers provide the overall system control.



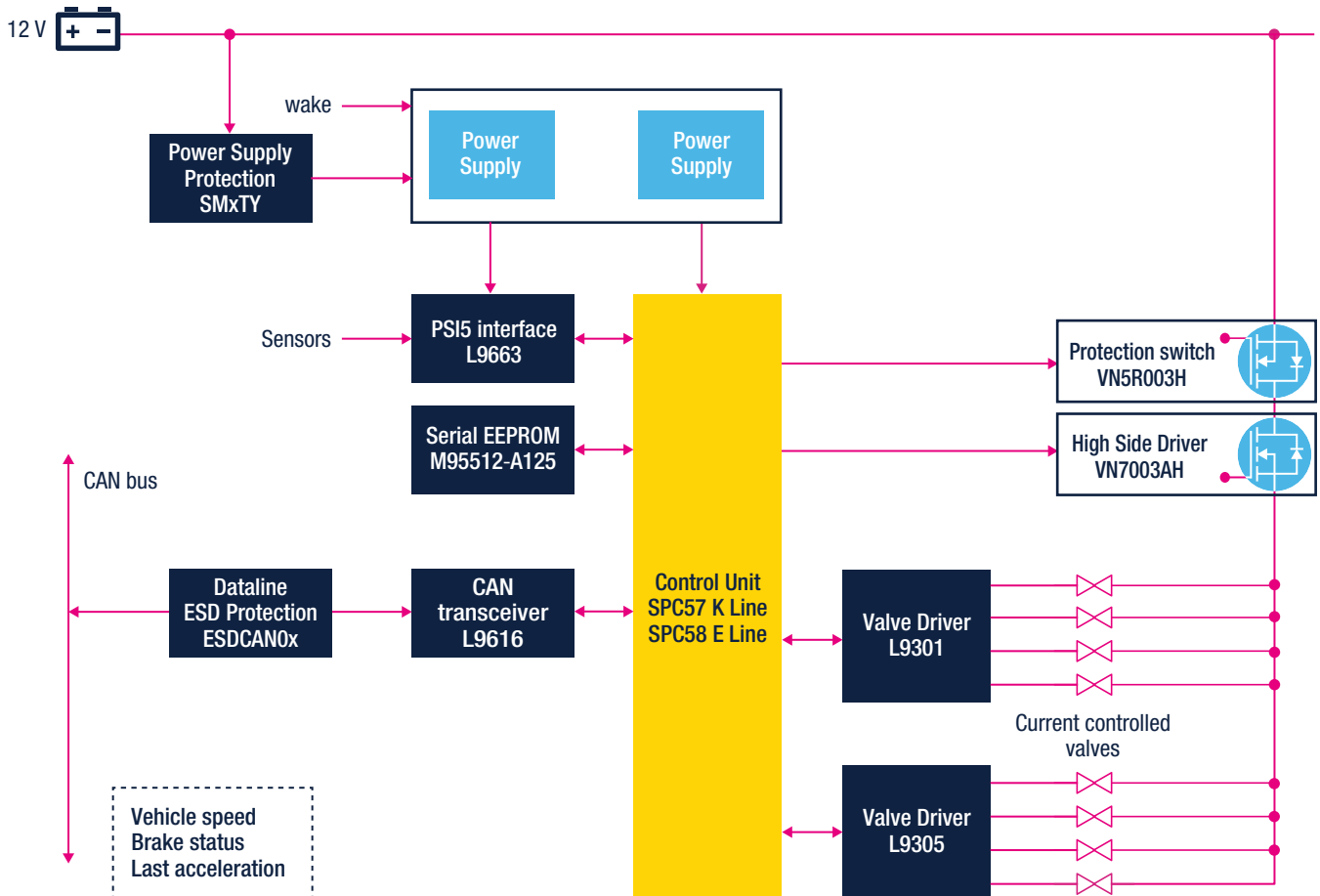
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www.st.com/electronic-stability-control

ACTIVE SUSPENSION

An advanced technology that enhances comfort for drivers and passengers, active suspension systems also allow 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).



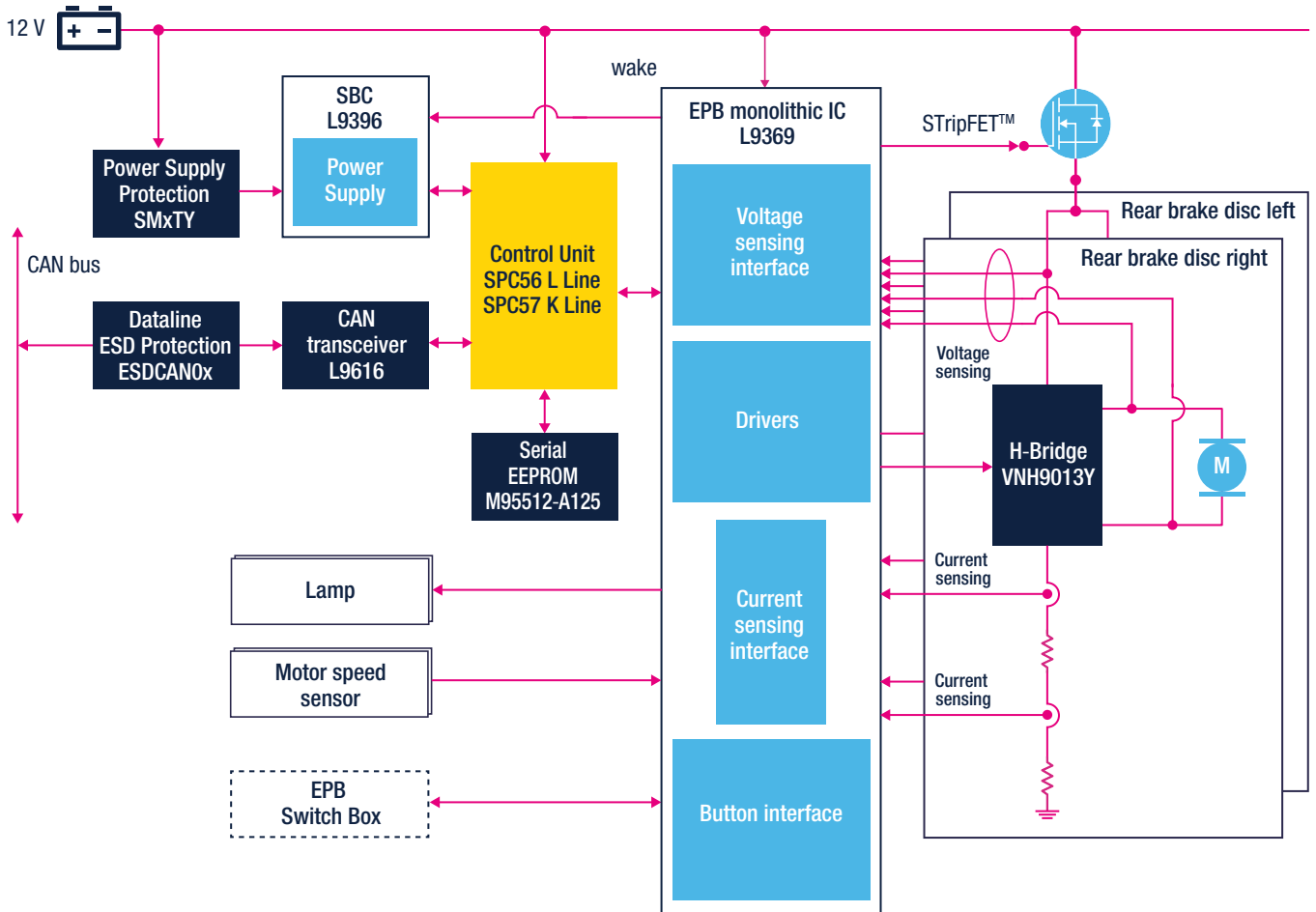
FIND OUT MORE

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 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

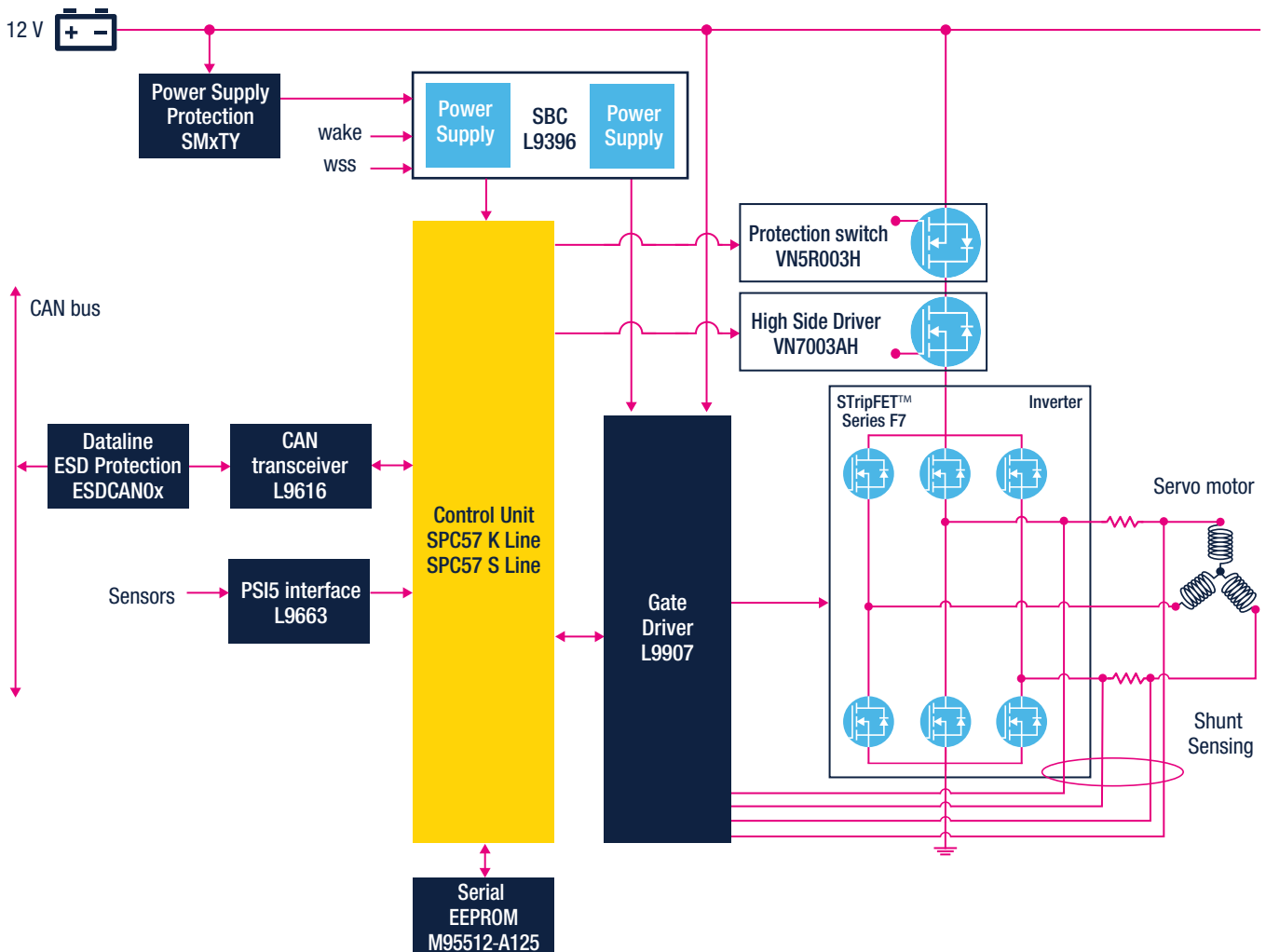
ELECTRIC POWER STEERING (EPS)

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.

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 48V domains. Dedicated power management ICs and CAN transceivers as well as a wide range of flexible and innovative Application-Specific Standard Products (ASSP), cover all possible system partitions. SPC5 32-bit automotive microcontrollers provide the overall system control.



FIND OUT MORE

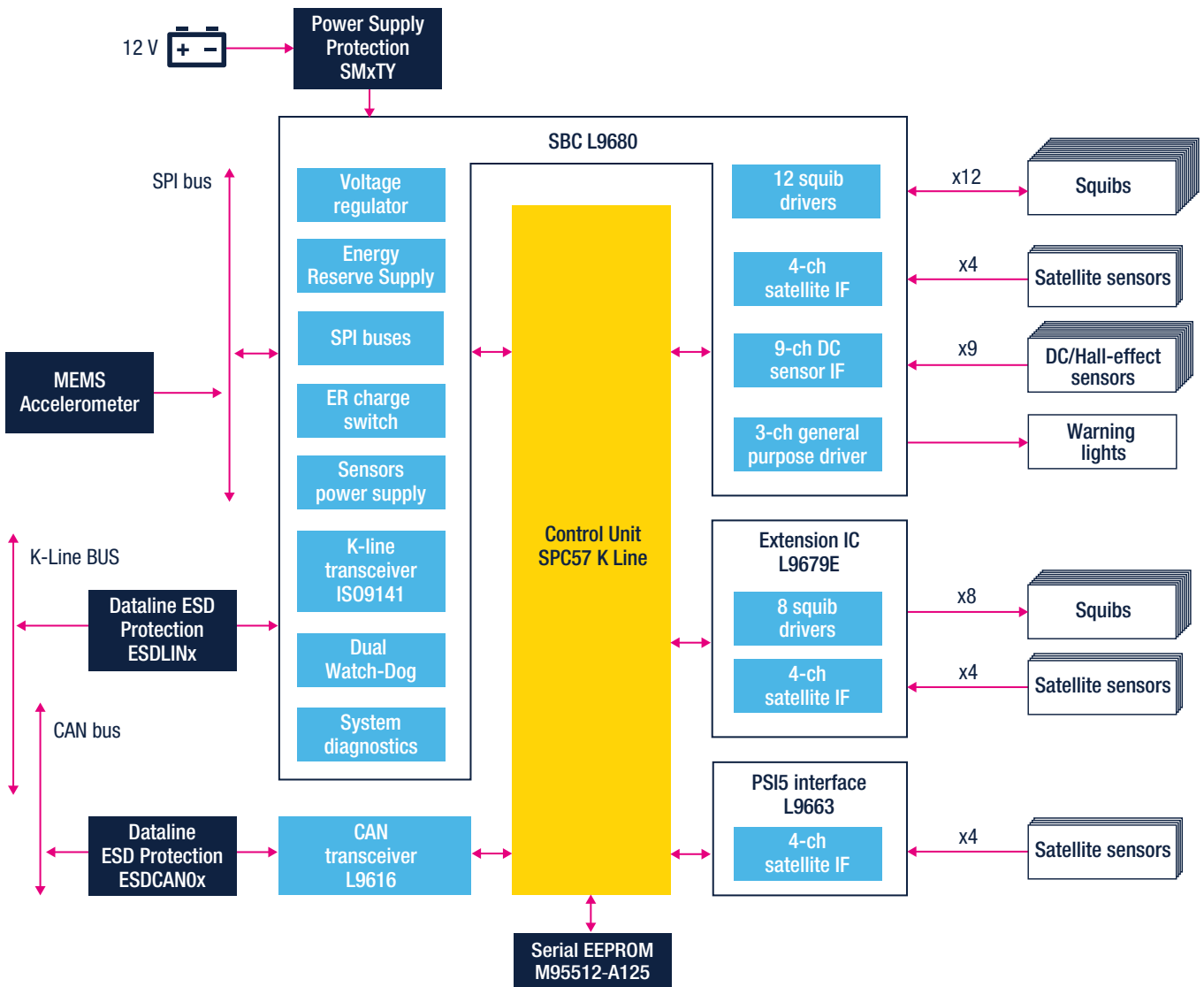
www.st.com/electric-power-steering

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), enhanced 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.



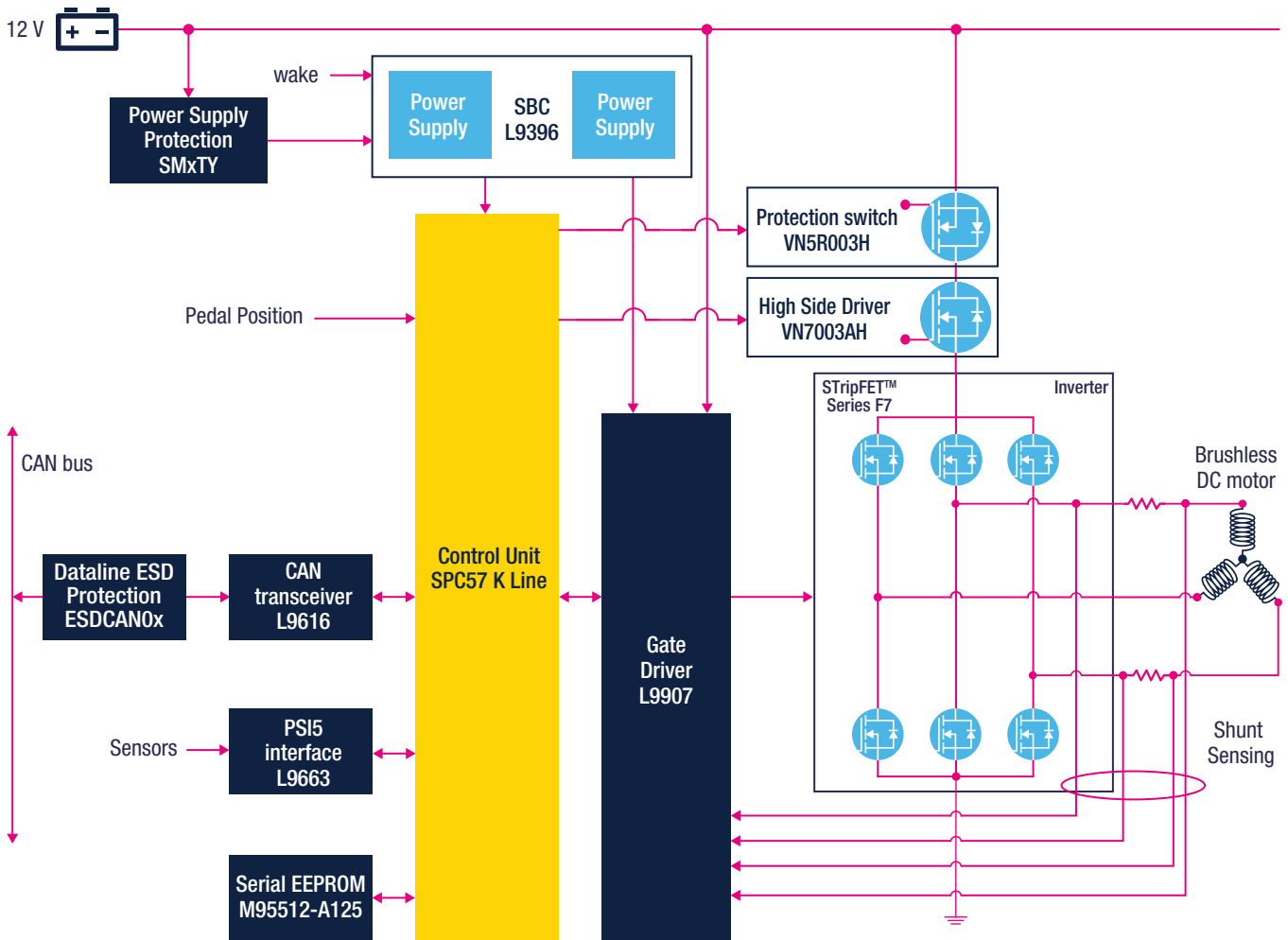
FIND OUT MORE

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, 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, 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 48V 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, these rectifier diode and thyristor series are available to design robust converters compatible with the 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 1700V, IGBTs with breakdown voltages ranging from 300 to 1250V and power bipolar transistors ranging from 15 to 1700V. 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.



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 widerange 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 (12V for automotive cars or 24V 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.

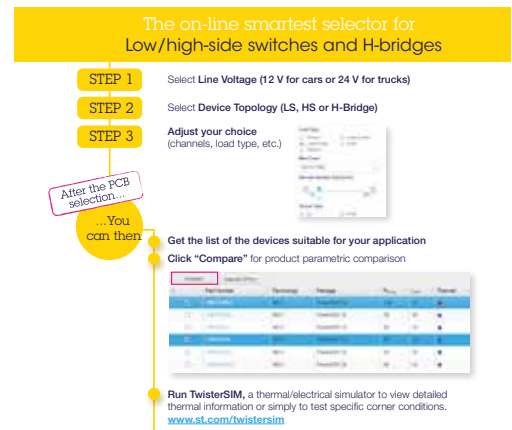
Key Features

- 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



L99LD21-ADIS



SPC560B-DIS



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 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

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 are also available for the SPC5 family.




SPC5
SPC5 MCUs
toolchain




Discovery kits
Quick starter kit for early evaluation

ST Discovery boards enable the user for a quick evaluation of main device features




Premium boards
Complete HW solutions for advanced development

ST Premium boards ensure full access to device's features and functionalities



SPC5Studio
Freeware Eclipse based Development Studio

SPC5Studio integrates our Resources Configurator, Code Generator supporting major third party tools



Embedded Software & AUTOSAR Solutions
Drivers and Software Libraries

Crypto and flash SW Libraries
Core & Instruction Self test Libraries
AUTOSAR MCAL



FIND OUT MORE

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



AUTODEVKIT™

A viable, simple, low-cost tool for automotive application engineers

A new development flow and toolset dedicated to the Automotive & Transportation market delivering to engineers the best and easiest way for quick evaluation and rapid prototyping in a common, integrated and flexible environment supporting complete ECU-like development.

AutoDevKit is an Eclipse plugin running under SPC5Studio Integrated Development Environment.



AEK MCU Discovery
and Functional
Boards

AEKD System
Solution
Demonstrators

STSW Embedded
Software

KEY FEATURES

- Focus in developing your application without bothering about hardware and software implementation details
- Assemble and re-assemble hardware and software components without compatibility issues
- Expand and customize your application adding new components, scaling your microcontroller for cost optimization, changing the compiler, adding a real-time operating system and other Eclipse-compatible plugins

FIND OUT MORE

Find out more at www.st.com/autodevkit

Software download www.st.com/autodevkitsw

Join our Community at <https://community.st.com/autodevkit>

**At STMicroelectronics
we create technology
that starts with You**



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Order code: BRAUTOCS0720

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