Automotive Solutions for
In-vehicle Infotainment

Contents

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) 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.
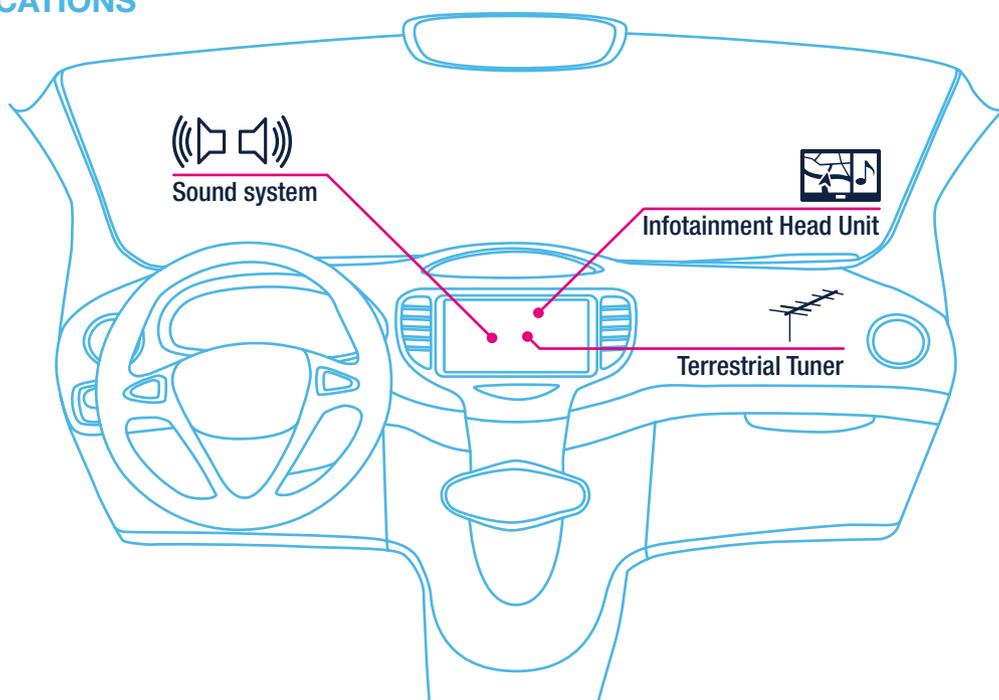
In-Vehicle Infotainment
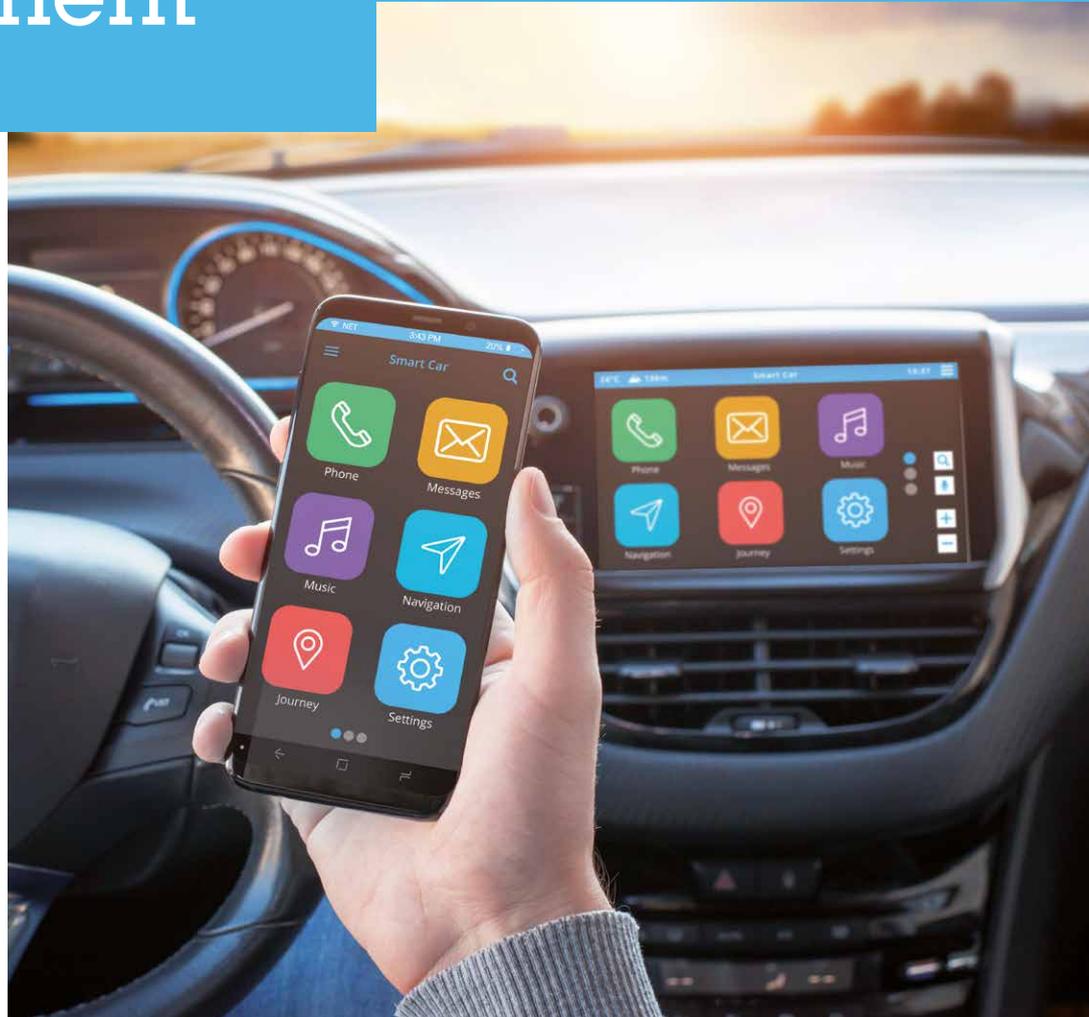
ST
provides IC solutions for complex infotainment cluster, integrating advanced audio and video features

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

FIND OUT MORE

www.st.com/in-vehicle-infotainment

Infotainment Module
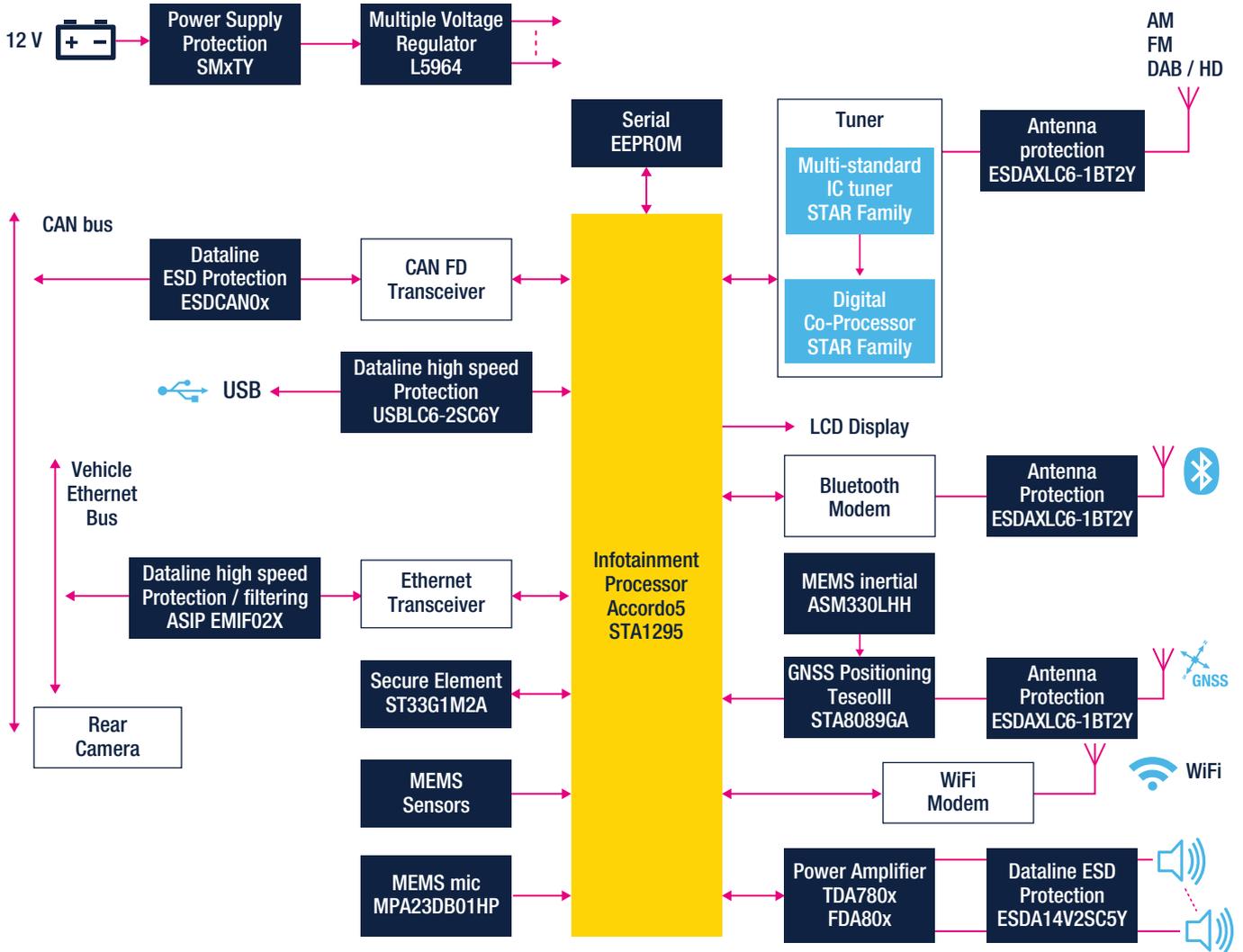Terrestrial Tuner
Sound System

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 class AB/D of audio power amplifiers.

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 RadioTM.

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.

## Architecture Example (FM Phase Diversity+ DAB 1.5)
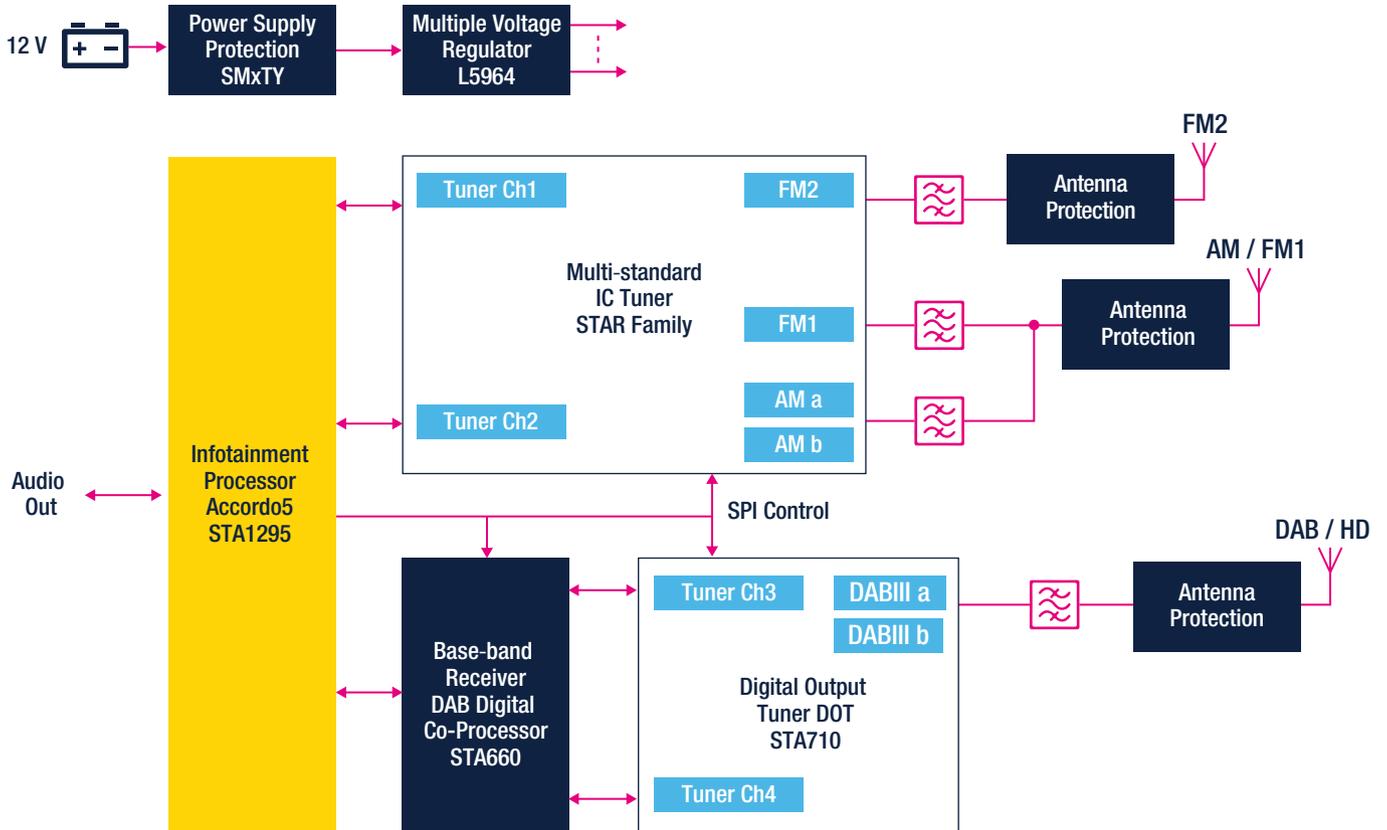
AUTOMOTIVE SOUND SYSTEMS

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.
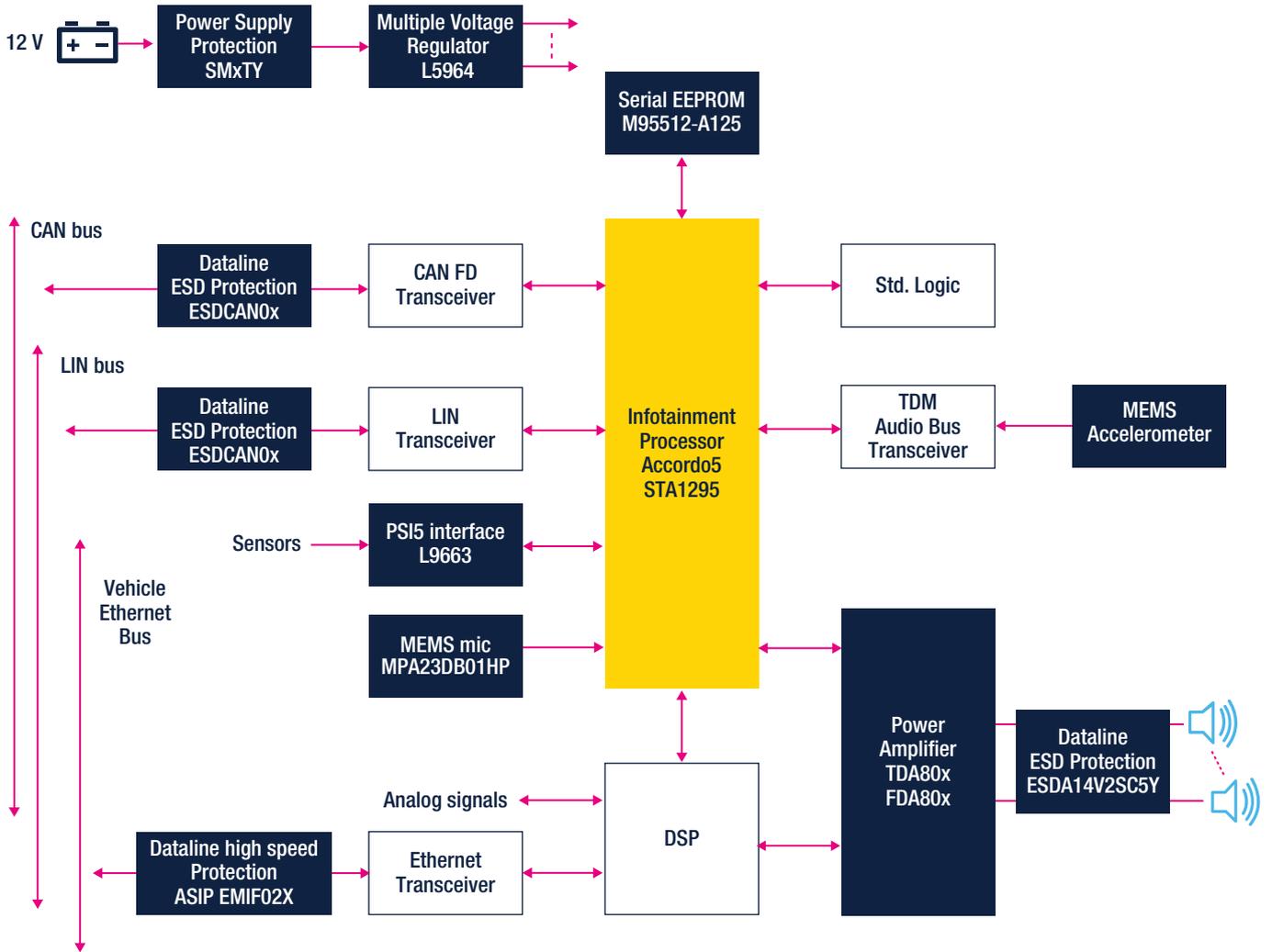
FIND OUT MORE

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.

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 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. 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 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.

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, with demonstration software packages are available too.

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

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 plug-in running under SPC5Studio Integrated Development Environment.

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 plug-ins

AutoDevKit

AEK MCU Discovery and Functional Boards

AEKD System Solution Demonstrators

STSW Embedded Software

Find out more at **www.st.com/autodevkit**
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