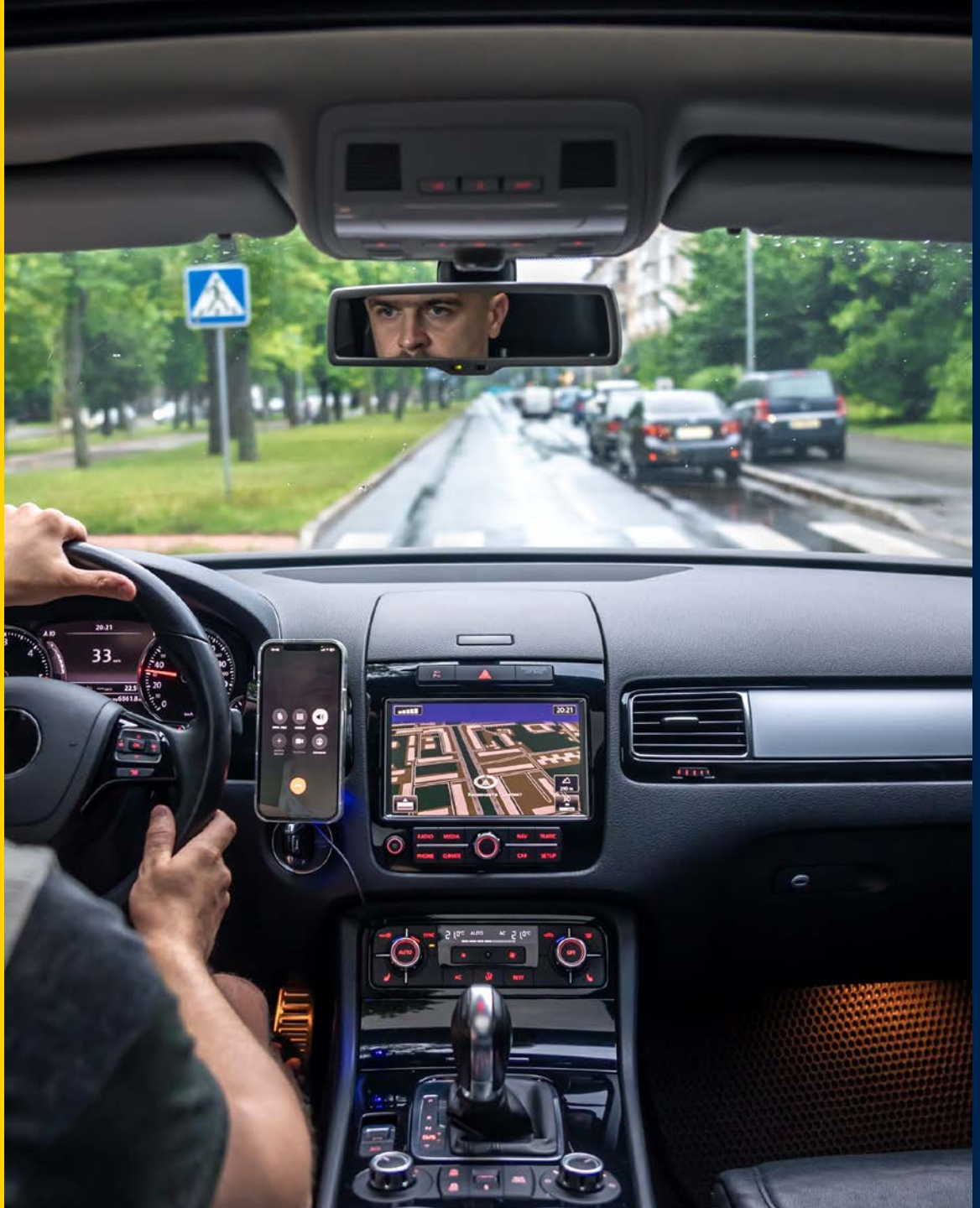


ST automotive PMICs and SBCs

October 2025

What is a power management IC for automotive systems?

PMICs and SBCs integrate essential power control elements into a single chip, reducing the component count and board space.

They allow an easy and cost-effective managing of automotive applications.

A PMIC is an integrated circuit designed to manage the power requirements of automotive electronic systems

Combines multiple power functions in a single chip: DC-DC converters, linear regulators, monitoring, sequencing, and safety features

Streamlines power distribution from the vehicle battery to various subsystems, ensuring efficient and reliable operation

SBCs complement PMICs with support features for the MCU (supervision, communication) and often CAN and/or LIN transceivers

Why use automotive PMICs and SBCs?

Reduce component count and PCB space

Enhance energy efficiency and reduce standby power consumption

Accelerate development time with integrated functions

Improve system reliability through built-in safety and monitoring

What are the advantages of ST automotive PMICs?

Flexibility and compatibility	Multichannel and configurable power supply schemes for diverse applications
	Battery compatibility eliminating the need for pre-regulators
Safety and reliability	Functional safety support up to ASIL-D standard
	Advanced features: reverse current protection, thermal, and load dump protection
	AEC-Q100 qualified
Integration and efficiency	Programmable via SPI/I²C with internal memory for flexible control
	High switching frequency for compact PCB design

What are the advantages of ST automotive SBCs?

Scalability	A scalable product portfolio to support a wide range of applications, MCU platforms, and system topologies.
	Integrated NVM enables precise PMIC and SBC configuration across diverse MCU families (ST and other), ensuring seamless adaptability.
Interoperability	Fully compatible with MCU power modes, requirements, and sequencing. Safeguards system supply from abnormal voltages.
	Continuously checks MCU health for potential risks.
	SBCs interface seamlessly with ST MCUs.
Safety ISO26262	ST MCU optimized SBCs support safety up to ASIL-D for all operating conditions.
	Integrated NFSO path ensures transition to one of multiple safe states, allowing graded responses to system faults.
	SPI, IRQ, and FCCU interfaces enable rapid communication between SBC and MCU.

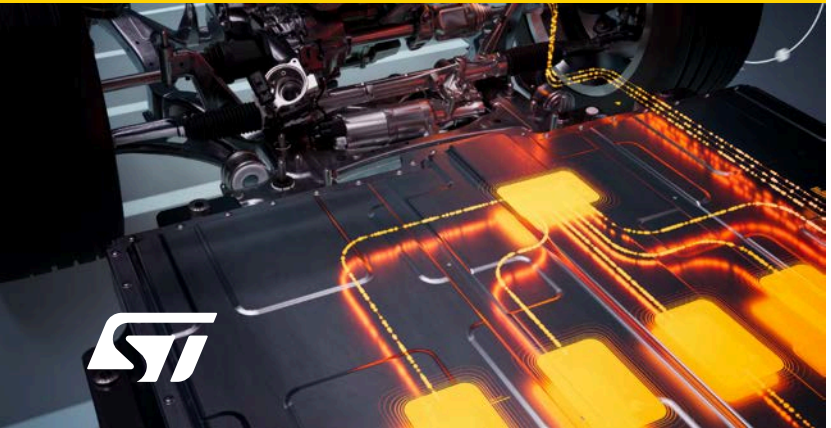
Where are PMICs and SBCs used in vehicles?

ADAS systems: camera module, radar, domain controllers

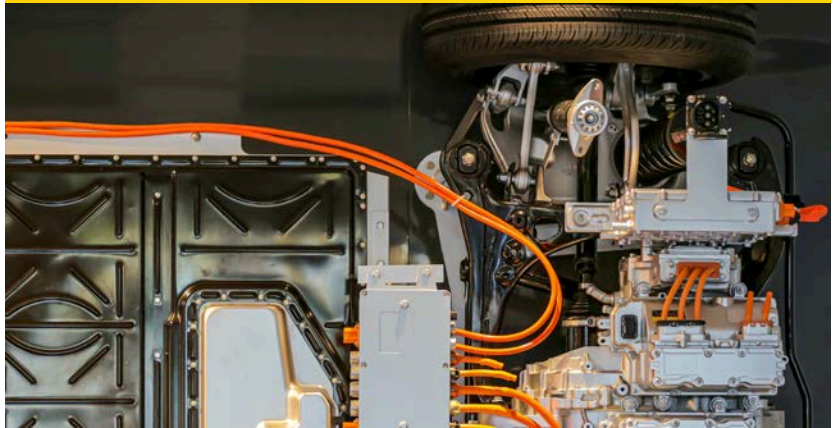
Electronic control units (ECU) and microcontroller units (MCU)

Infotainment: instrument clusters, telematics control units (TCU)

Zonal architecture power distribution

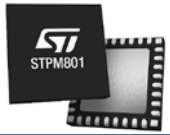


Braking, steering, powertrain systems



And more…

ST automotive PMIC product portfolio

For battery protection	For flexible power regulation	For ADAS and ECU power rails	For high-current processors and GPUs	For general electrification
Hot swap and ideal diode controllers	Buck-Boost controllers	Multirail battery-compatible PMICs	High-performance multiphase controllers	Dual switching and linear regulators
STPM801 	STPM802A 	L5965 	STPM098C 	L5963 
		STPM066S 		L9001 
		SPSA068 		

Support evaluation boards, design resources, and technical support

ST automotive SBC product portfolio

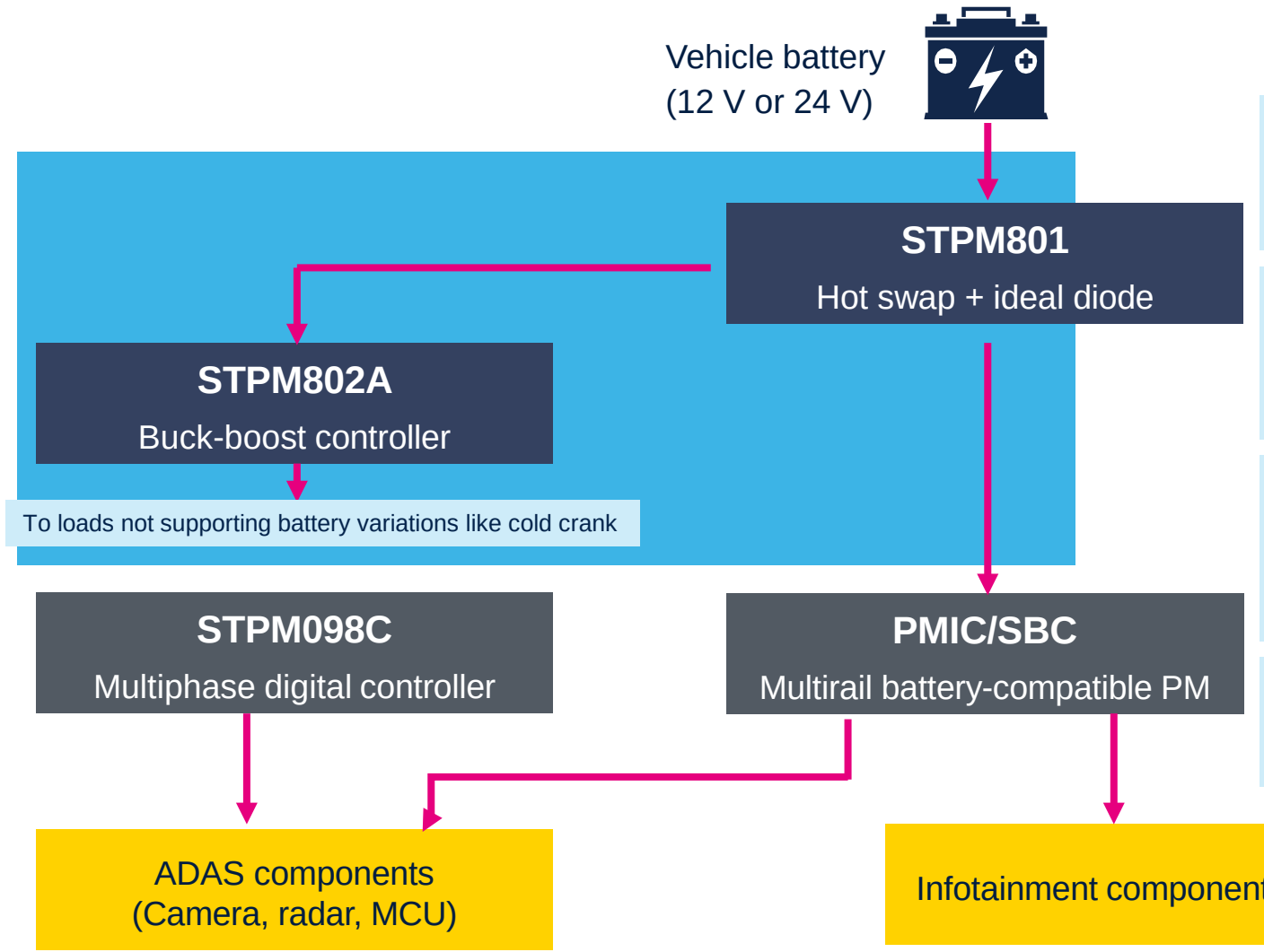
STM32xA and Cost-champions MCUs	SPC5 and Mainstream MCUs	Stellar E line and Mainstream MCUs	Stellar P line and Performance-class MCUs	Stellar G line and Performance-class MCUs
General purpose	General purpose and Performance	Electrification (OBC, DC-DC, …)	Electrification (Xin1, …)	High end body / zonal vehicle architecture
L99PMx 	SPSB081 	L9396 	SPSB100B 	SPSB100B 
SPSB081 	L9396 	SPSA068 	SPSB100G 	SPSB100G 

Support	evaluation boards, design resources, and technical support

What is the difference between PMIC/SBC and PMU?

PMIC is a single integrated circuit that handles multiple power management tasks on-chip. SBC manages the MCU	A power management unit (PMU) is a higher system-level unit and may include PMICs, SBCs & other components
• An integrated circuit that manages power functions such as voltage regulation, sequencing, monitoring, and protection within a device	• A broader functional block or module that manages power distribution and control, often consisting of multiple ICs or components, including PMICs
• Typically, a single chip integrating multiple power management functions	• It can be a system-level block that may include one or more PMICs, regulators, controllers, and interfaces
• Regulates voltages, controls power sequencing, protects against faults, and often includes communication interfaces (SPI, I²C)	• Coordinates overall power management strategy and may include system-level power sequencing, battery management, and power distribution
• Focused on integrated power regulation and control at the chip level	• Encompasses system-level power management, possibly involving software control and multiple hardware components
• Used in electronic subsystems to efficiently manage power rails and MCUs in all their working conditions, ensuring system safety	• Used at the system or subsystem level to coordinate power flow and management across multiple components or ICs

Automotive PMU block diagram featuring ST PMICs



STPM801 manages hot swap and ideal diode functions (battery protection and reverse current prevention). Required in high-safety systems like autonomous driving.

The STPM802A buck-boost controller regulates voltage for downstream systems or a PMIC/SBC. Required when the load in not able to sustain battery variations like cold crank.

ST PMICs or SBCs can be supplied directly by the car battery or through the STPM801. They provide multiple regulated voltage rails to ADAS and infotainment subsystems or MCUs.

The STPM098C is a high-performance multiphase controller supplying high-current processors in ADAS.

The PMICs/SBCs deliver efficient, safe, and flexible power to the load.

ST PMICs in ADAS PMUs

Example: ADAS power management unit

- Manages power from the vehicle battery (12 V or 24 V) to various ADAS components such as cameras, radar sensors, and domain controllers.
- Ensures safe power-up sequencing, fault detection, and energy efficiency.
- Supports functional safety requirements (ASIL-D).

ST PMICs inside the PMU

PMIC	Role in PMU	Key features
STPM801	Hot swap and ideal diode controller	Protects against reverse polarity, supports dual battery systems, ensures safe power switching
STPM066S	Battery-compatible multirail PMIC	Supplies multiple regulated rails for MCUs, sensors, and processors with SPI control
STPM802A	Buck-boost preregulator	Provides stable intermediate voltage rails for downstream regulators in zonal architectures
STPM098C	Multiphase digital controller	Supplies high-current processors and GPUs with efficient multiphase power conversion

PMU functions enabled

- Safe, efficient power distribution to ADAS modules
- Real-time monitoring and diagnostics via SPI/I²C
- Programmable power sequencing and fault management
- Reduced external components and PCB size

ST PMICs in infotainment system PMUs

Example: infotainment system power management unit

- Manage power for infotainment components such as instrument clusters, TCU, USB hubs, and chargers.
- Provide multiple voltage rails with high efficiency.
- Support standby modes to reduce power consumption when the vehicle is off.

ST PMICs inside the PMU

PMIC	Role in PMU	Key features
L5965	Battery-compatible multirail PMIC	Supplies multiple voltage rails with programmable outputs and diagnostics
SPSA068	Battery-compatible PMIC for MCU	Provides low quiescent current and supports functional safety
L5963	Dual switching and one linear regulator	Provides high power rails with a flexible configuration

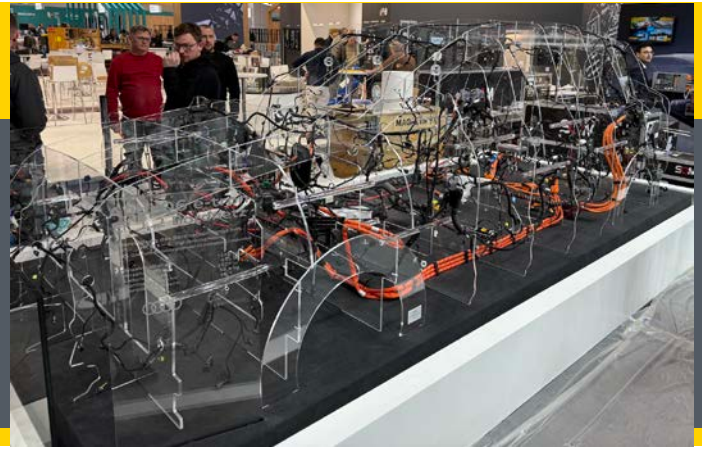
PMU functions enabled

- Flexible power rail configuration
- Energy-efficient standby and low-power modes
- Integrated safety and monitoring
- Simplified system design with fewer external components

ST SBCs as companion chip for MCUs

Example: ST Stellar MCU power ,anagement

- Manages power for MCUs like the new ST Stellar family.
- Ensures safe power-up sequencing, fault detection, and communication.
- Supports functional safety requirements (ASIL-D) in all microcontroller’s state, like run-mode, smart-power and stand-by.



ST SBCs inside the PMU

SBC	Main target
L99PMx	Power supply for STM32 automotive MCUs
SPSB081	Power management for MCUs with low core current, like STM32 automotive and SPC5 MCUs for general purpose
L9396	System basis chip especially for MCUs used in ABS, EPS, and transmission systems.
SPSB100/G	Power management for powerful MCUs, like Stellar G (G6, G7) and P (P6, P7) lines, targeting zonal architectures and electrification (e.g., X in 1)

Safety functions enabled

- NFSO path to bring the system to a safe state
- SPI, IRQ, and FCCU between PMIC and MCU for fast issue signaling
- NRESET pin to MCU to keep MCU under reset before the supplies are available and if no issue is detected
- Different safe states with different levels of severity

Why choose ST automotive power management ICs?

Integrated, multifunction PMICs / SBCs streamline automotive power design, reducing component count and PCB size

High efficiency and programmability with SPI/I²C control, internal memory, and high switching frequencies for optimized power management

Advanced safety features including thermal and load dump protection, supporting ASIL-D functional safety

A comprehensive product portfolio and ecosystem offering evaluation boards, design resources, and expert technical support to accelerate development

Flexible, battery-compatible solutions tailored for diverse automotive applications: ADAS, ECUs, infotainment, and zonal architectures

ST **SBCs** are designed as **companion chips** for ST MCUs and efficient power management devices for third-party automotive MCUs.

Our technology starts with You

Find out more at www.st.com