



Advanced power management for automotive applications

From the plug to the processor

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Advanced power systems

Sustainable, safe and simplified

Power management is a foundational technology that drives performance across processors and peripherals in today's most demanding applications—from automotive and industrial systems to IoT and consumer electronics.

Our robust portfolio includes highly integrated Power Management ICs (PMICs), System Basis Chips (SBCs) and wireless power solutions, all engineered to

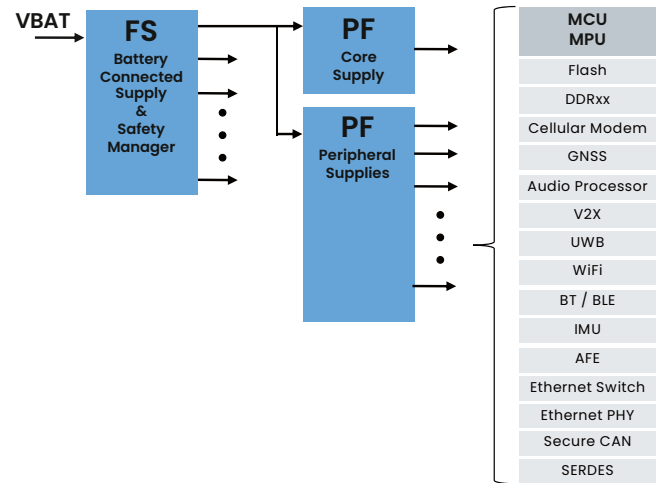
deliver optimal efficiency, functional robustness and performance in energy-sensitive environments. With a focus on sustainability, safety and simplicity, our advanced power technologies streamline system design and accelerate development. We deliver scalable solutions from the plug to the processor by standardizing power management hardware, safety architecture and software integration.



Together, we power a brighter, safer and cleaner future, from the plug to the processor: nxp.com/powermanagement

Automotive system power

Automotive Power Management Integrated Circuits (PMICs) and System Basis Chips (SBCs) provide efficient power delivery, scalable safety from ASIL QM to ASIL D and special functions common to specific applications to optimize the power density and the Bill of Material (BOM). Select an FS device and any combination of PF devices to create a complete system power solution.



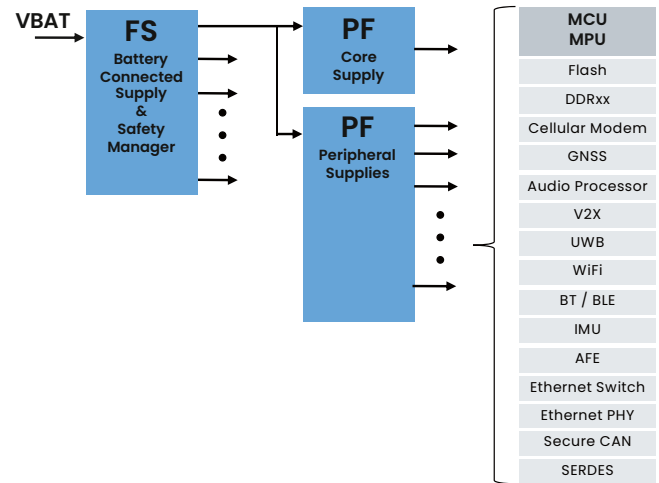
Battery connected SBCs and PMICs



FS65	FS23	FS26	FS84/FS85	FS86	FS27 - In Dev	
HV 2 A Buck/Boost LVBuck 0.8 A-2.2 A 400 mA Tracker VKAM	HVBuck 600 mA or LDO 250 mA 2x HVLDos 100 mA & 150 mA	HVBuck 1.5 A Boost CTRL LVBuck 1.65 A 2x 400 mA LDOs 2x 150 mA Trackers VREF 30 mA	HVBuck CTRL 10 A 1.5 A Boost 2x 2.5 A LVBuck Multi-PH 2.5 A LVBuck 2x 400 mA LDOs	HVBuck CTRL 15 A 1 A Boost CONV 1x LVBuck 2.5 A 2x 400 mA LDOs	HVBuck 2.5 A Boost, SEPIC, Flyback CNTL LVBuck 3.5 A 2x LDOs 400 mA VREF 80 mA 0.75% 2x 150 mA Trackers	
LPOFF, LDT, AMUX, GPIO	LPOFF, LPON, LDT, AMUX, 6x GPIO 4x 150mA HSD	LPOFF, LPON, LDT, AMUX, VMON, HWID	LPOFF, AMUX, 5x VMON	LPOFF, AMUX BATSW 10x VMON	LPOFF, LPON, LDT, AMUX, GPIO	
ASIL D	ASIL QM / B	ASIL B/D	ASIL B / ASIL D	ASIL B/D	ASIL B/D	
CAN + LIN	CAN + LIN					
Vin = Up to 40V			Vin = Up to 60V		Vin = Up to 70V	
FS45	FS24	FS56	FS25 - In Dev	VR5510	FS04 - In Dev	FS28 - In Dev
HV 2 A Buck/Boost LDO 500 mA 400 mA Tracker VKAM	HVBuck 400 mA 150 mA HV LDO	HVBuck 3 A HVBuck CNTR 15 A	Optional HVBuck CTRL 10 A Or 2.5 A HVBuck Boost CTRL 3x LVBuck 3.5 A Multi-PH 2x LVBuck 1.2 A 2x 400 mA LDOs VREF 400 mA	HVBuck CTRL 10 A 1 A Boost CONV 2x LVBuck 2.5 A Multi-PH LVBuck 2.5 A 3x 400 mA LDOs 10 mA HV LDO	HVBuck CTRL 20 A 1 A Boost CONV 4x LVBuck 2.5 A 150 mA LVBuck 1x 400 mA LDO	48V PMIC
LPOFF, LDT, AMUX, GPIO	LPOFF, LPON, LDT, AMUX, HWID	LPOFF, LPON, 4x VMON 3x GPIO	LPOFF, LPON, 7x GPIO, LDT BATSW, ADC	LPOFF, LPON 5x VMON	LPOFF, LPON Ideal Diode 3x ADC VMON 4x GPIO	Coming soon
ASIL D	ASIL QM / B	ASIL QM/B	ASIL B / D	ASIL B / D	ASIL QM / B / D	
CAN + LIN	CAN					

Automotive system power

Automotive Power Management Integrated Circuits (PMICs) and System Basis Chips (SBCs) provide efficient power delivery, scalable safety from ASIL QM to ASIL D and special functions common to specific applications to optimize the power density and the bill-of-material. Select an FS device and any combination of PF devices to create a complete system power solution.



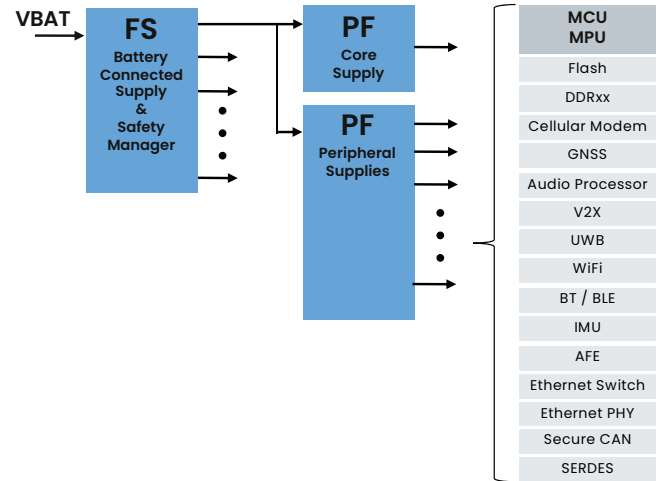
Low voltage PMICs



i.MX MPU Attach	PF8x50	PF8x01	PF7100	PF09 (In Dev)	MPU Core Supply	
	2.5 A Bucks 1-4 Multi-PH	2.5 A Bucks 1-2 Multi-PH	2.5 A Bucks 1-4 Multi-PH	3.5 A Bucks 1-2 Multi-PH	PF530x	PF54 (In Dev)
	2.5 A Bucks 5-6 Multi-PH	2.5 A Bucks 3-4 Multi-PH	2.5 A Buck 5	3.5 A Bucks 3-4 Multi-PH	8 A, 12 A, 15 A Buck w/ AVP	15 A Bucks 1-2 Multi-PH
	2.5 A Buck 7	2.5 A Buck 5	2x 400 mA LDO / Load Switch	3.5 A Buck 5	ASIL QM/B/D	ASIL QM/B
	4x 400 mA LDO / Load Switch	3x 400 mA LDO / Load Switch	2x Li-Cell Charger RTC LDO 10 mA	3x 400 mA LDO / Load Switch		
System Peripheral Supply	Li-Cell Charger RTC LDO 10 mA	Li-Cell Charger RTC LDO 10 mA	ASIL QM/B	Li-Cell Charger RTC LDO 10 mA	PF5200	
	ASIL QM/B	ASIL QM/B		ASIL QM/B	8 A Bucks 1-2 Multi-PH	ASIL QM/B
System Peripheral Supply	PF5020	PF5024	PF5030	PF0300 (In Dev)	PF5103 (In Dev)	PF5113 (In Dev)
	2.5 A Bucks 1-2 Multi-PH	2.5 A Bucks 1-4 Multi-PH	3.5 A Bucks 1-2 Multi-PH	3.5 A Bucks 1-3 Multi-PH	3.5 A Bucks 1-3 Multi-PH	3.5 A Bucks 1-3 Multi-PH
	2.5 A Buck 3	ASIL QM/B	2.5 A Buck 3	500 mA LDO / Load Switch	2x 400 mA LDO / Load Switch	2x 400 mA LDO / Load Switch
	400 mA LDO / Load Switch		2x 400 mA LDO / Load Switch	ASIL QM	ASIL QM/B	ASIL QM/B
	Li-Cell Charger RTC LDO 10 mA	PF5023	ASIL QM/B/D			
System Peripheral Supply	ASIL QM/B	2.5A Bucks 1-3 Multi-PH			PF5123 (In Dev)	
		ASIL QM/B			3.5 A Bucks 1-3 Multi-Ph	ASIL QM/B

Automotive system power

Automotive Power Management Integrated Circuits (PMICs) and System Basis Chips (SBCs) provide efficient power delivery, scalable safety from ASIL QM to ASIL D and special functions common to specific applications to optimize the power density and the bill-of-material. Select an FS device and any combination of PF devices to create a complete system power solution.



System power examples

Automotive Advanced Power System Solutions

Market	Application	Processor	System Power Solution
Software-Defined Vehicle	End Node	S32K1, S32K31, NCJ29Dx, KW4x	FS23 ⁽³⁾ or FS24 ⁽³⁾
	Zone – Low End	S32K3x	FS26 ⁽³⁾⁽⁴⁾ or FS27 ⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾
	Zone – Mid Range	S32K5x	FS25 ⁽³⁾
	Zone – High End	S32Z2	VR5510 ⁽¹⁾⁽³⁾ + PF53 ⁽⁵⁾ or FS25
	Gateway	S32G2	VR5510 or FS25
		S32G3	VR5510 + PF53 or FS25 + PF53
ADAS and Safe Driving	Central Compute	S32N	FS04 ⁽¹⁾⁽³⁾ + 2xPF53's + (PF5103 or PF09 ⁽³⁾)*
	Camera	S32K3 + EyeQ6L	FS86 ⁽¹⁾ + PF53 + PF5103
	Corner Radar	SAF85xx	PF5113 or FS84 ⁽¹⁾
	Long Range Radar	S32R41	FS86 + PF5113
Electrification, Powertrain, Safety and Chassis	Imaging Radar	S32R45	FS86 + PF53 + PF5113
	Traction Inverter	S32K33x – S32K38x	FS65 ⁽³⁾⁽⁴⁾ or FS26 or FS27
	BMS	S32K33x – S32K38x	FS65 or FS26 or FS27
	OBC + DC/DC	S32K33x – S32K38x	FS65 or FS26
	Xin1	S32K39x	FS27
		S32Z2	FS86 + PF5030
Infotainment and In-Vehicle Experience	X by Wire (Steering and Braking)	S32K39x	FS27
		S32K38x	FS26
	Cluster and Infotainment	i.MX95x	FS56 ⁽³⁾ + PF09 + (1 or 2x PF53's) + (PF03 or PF5103)*
	Telematics and Connectivity	i.MX94x	FS56 + PF09 + PF53 + (PF03 or PF5103)*
	Camera (DMS) and HMI	i.MX93	FS56 + PCA9452 ⁽³⁾ or PF09
	Audio Silver Box	S32K3 + SAF9xx	FS56 + PF03

(1) 24V Capable, (2) 48V Capable, (3) Low Power Mode, (4) Long Duration Timer, (5) Adaptive Volt Position

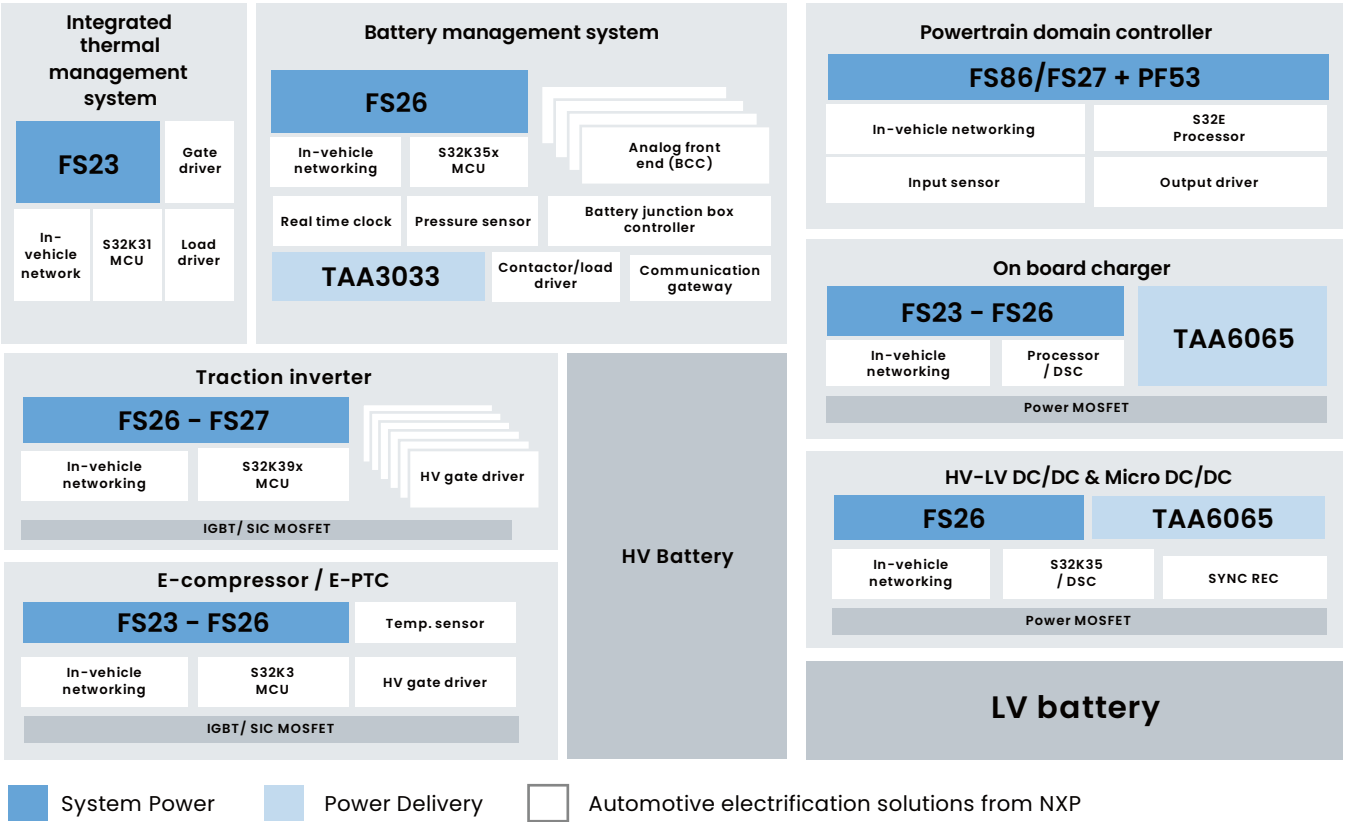
(*) optional device, application dependent

Electric powertrain

From battery management to propulsion domain control, our aim is to simplify the electrification transition. NXP delivers an electrified system solution, incorporating optimal performance, robust functional safety and power management features that automakers and developers require for their next generation of vehicles.



Efficiently powering electric vehicle sub-systems



Learn more about [Powertrain-Vehicle-Dynamics](#)

FS27 - Safely powering traction inverter systems

Power flexibility and scalability

- 12V/24V/48V configurable 30 W front-end
- Scalable power delivery HV Buck up to 2.5 A MCU core up to 3.5 A
- OTP selectable voltages and power up sequencing
- OTP versions for S32K3, S32K5 plus NON-NXP MCUs: TC4x, Stellar SR6x and RH850-E2

Leading safety concept

- Fit for ASIL B/D systems
- LBIST and latent fault monitoring with ABIST on demand
- External OV/UV monitoring
- External hardware fault monitoring

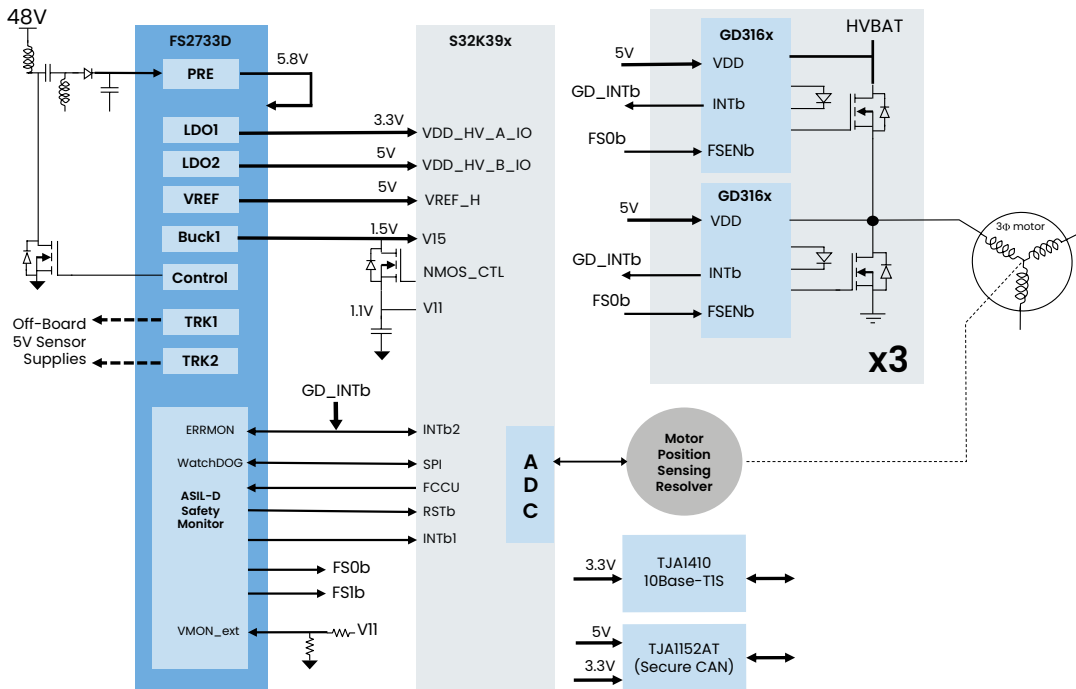
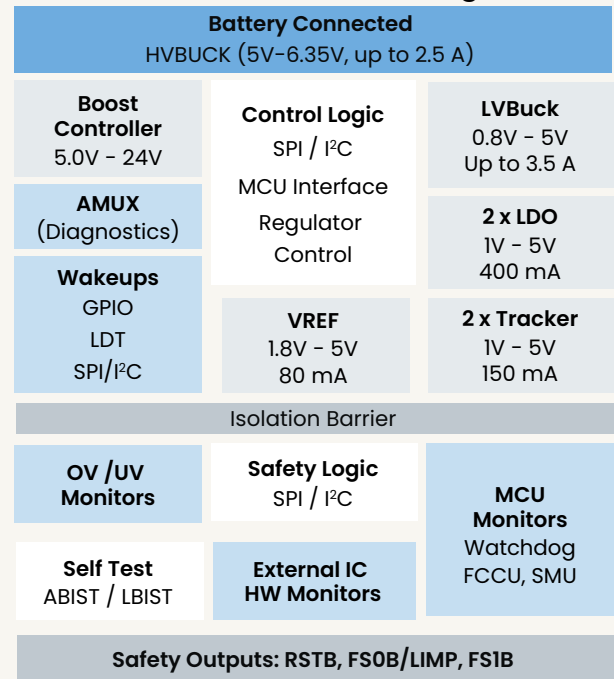
System management

- Standby mode (25 μ A) with fast wakeup (<3ms)
- SW and safety compatibility with FS26
- AUTOSAR ISO 26262 software
- Long duration timer (optional) up to 6 months

Other applications

- BMS, OBC, zone, steering, braking and suspension

FS27 Functional Block Diagram



Learn more about [FS27](#)

FS26 - Safely powering battery management systems

Power flexibility and scalability

- Configurable boost controller (front or back)
- Scalable power delivery
- HV Buck up to 1.5 A
- MCU core up to 1.65 A
- Configurable voltages and power up sequencing
- OTP versions for S32K3, plus NON-NXP MCUs: TC2x, TC3x, and RH850

Leading safety concept

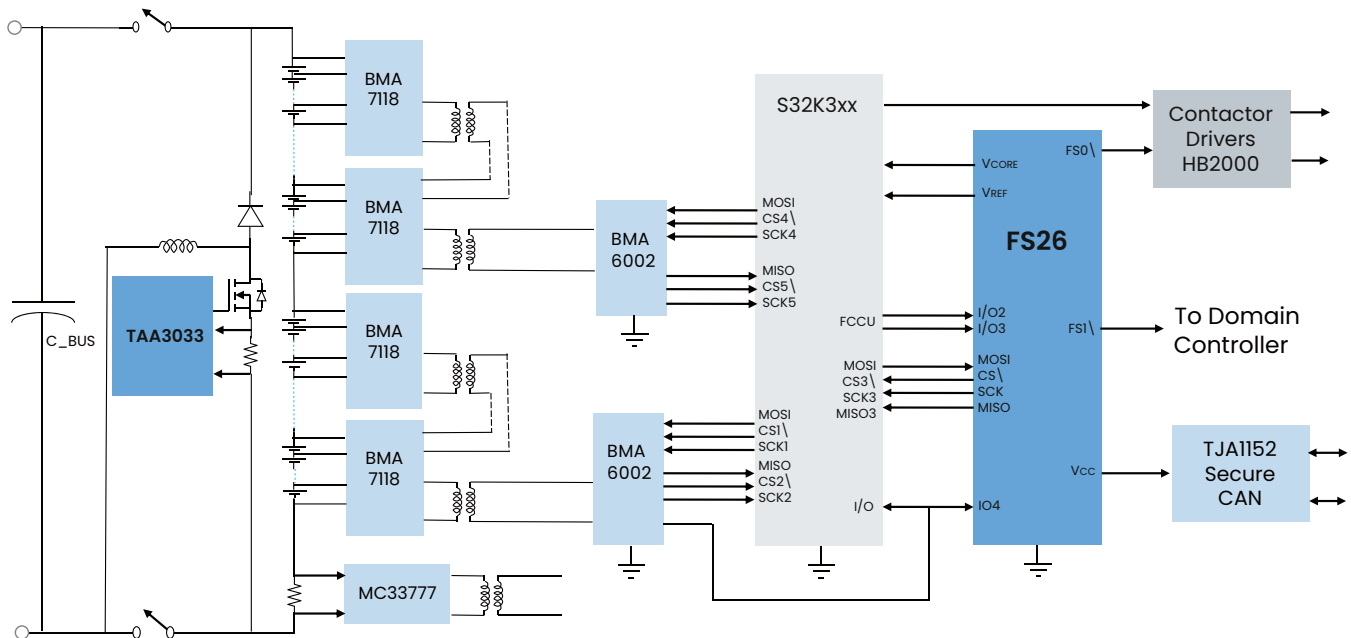
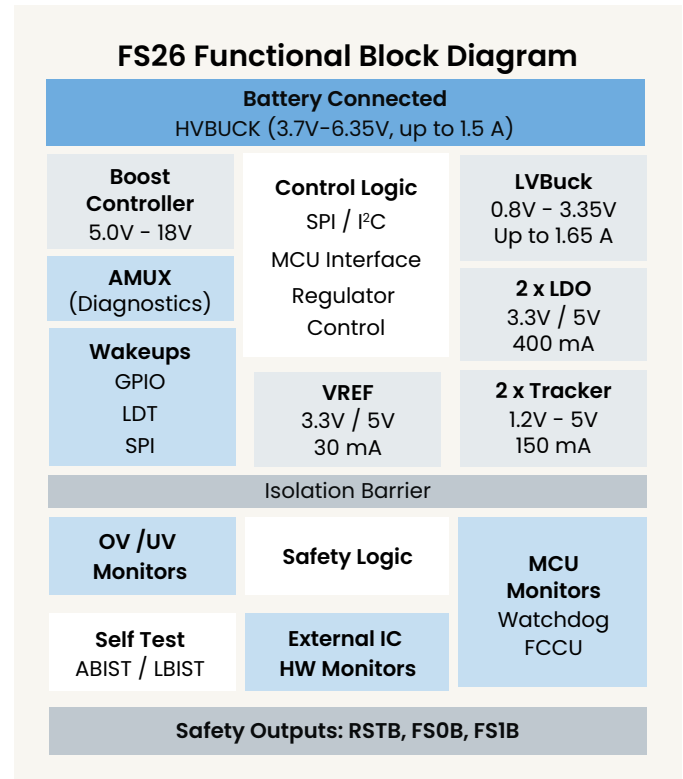
- Fit for ASIL B/D systems
- LBIST and latent fault monitoring with ABIST on demand
- External OV/UV monitoring
- External hardware fault monitoring

System management

- Standby mode (32 μ A)
- SW and safety compatibility with FS27
- AUTOSAR ISO 26262 software
- Long duration timer (optional) up to 6 months

Other applications

- OBC, inverter, zone, steering, braking, suspension, and many more



Learn more about [FS26](#)

TAA3033 – Safely charging high voltage system bus capacitors

Operates as a constant current controller to pre-charge the DC-link capacitor of xEV traction inverters

Key benefits

- **Reduced system cost and size:**
No high-current rated contactor and bulky power resistor needed
- **Better performance** with active regulated constant pre-charge current and **faster charging** cycle
- **Improved reliability:** No inrush current at start-up and closing of main contactors without hot switching
- **Flexibility:** Peak current and ripple adjustable by internal comparator level and external sense resistor.
- Supports low-side and high-side operation
- Suitable to drive Si and SiC power MOSFETs

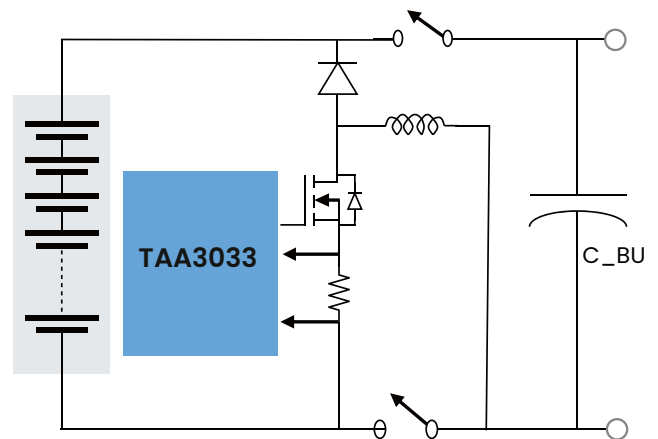
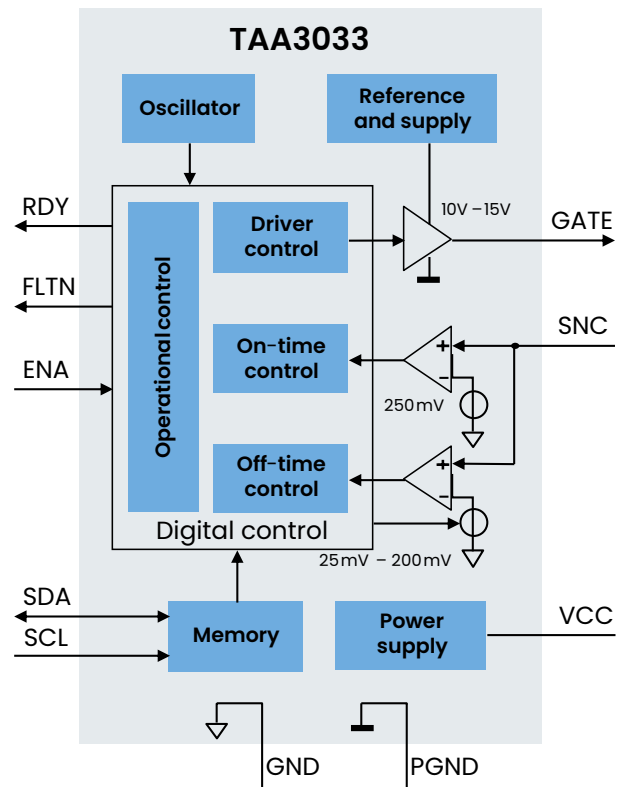
Target applications

Automotive:

- (Plug in) HEV battery management systems
- EV battery management systems

Industrial:

- Stationary battery energy storage system (ESS)
- Hot swap applications



Please contact your NXP sales representative for additional information.

In-vehicle infotainment (IVI)



Cluster and infotainment

SOC: i.MX 95/952

PMIC: PF09 and PF53

- Entry-mid cockpit domain controllers
- Standalone infotainment
- Standalone cluster



Telematics and connectivity

SOC: i.MX 943

PMIC: PF09 and PF53

- Low to high telematics and V2X
- Smart antenna systems
- Connectivity domain controllers



Camera, display and HMI

SOC: i.MX 943

PMIC: PCA9452/PF09

- DMS/OMS
- Standalone touch displays
- Hard button replacement

Scalable

- Main PMIC (PF09) – system power and safety management
- Core supplies (PF53) – scalable for i.MX
- System PMIC (PF51) – peripherals

Power efficient

- ULPOFF/STANDBY mode configuration
- Higher current with extended efficiency
- Enhanced tight accuracy and transient response for BOM optimization

Power mode control

- Configurable output and independent output voltage monitoring
- System low power mode
- Dedicated interface and optimized SW control

Safe

- Co-architected ASIL B safety i.MX 9x system
- Safe communication and interface
- Independent fault monitoring

Low risk

- System HW reference design
- PMIC SW driver in SDK
- Total system level support



Learn more about [Infotainment](#)

Efficiently powering eCockpit systems

Power flexibility and scalability

- Scalable power delivery with multi-phase options
- OTP memory selectable voltages and power up sequencing minimizing external components
- Configurable GPIO

Leading safety concept

- Safety scalable (QM/ASIL B/ASIL D)
- LBIST and latent fault monitoring with ABIST on demand
- External OV/UV monitoring
- External hardware fault monitoring

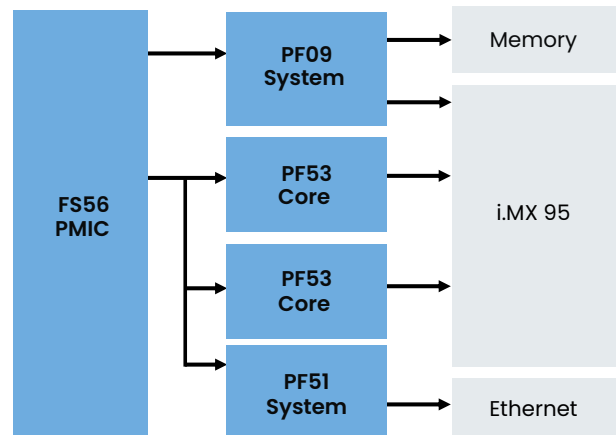
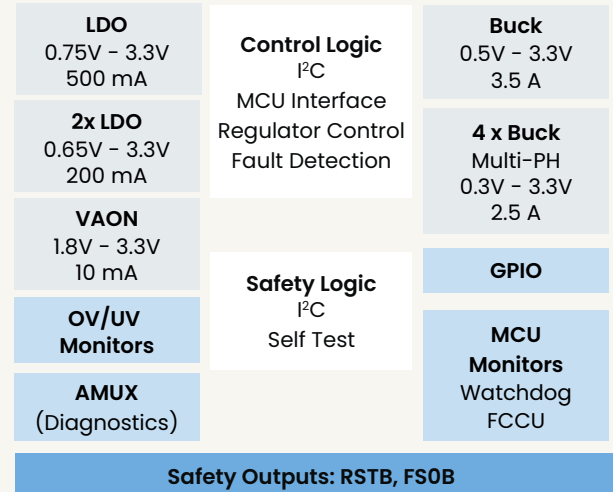
System management

- Multiple standby modes including DDR refresh
- Minimized EMC with spread spectrum, frequency tuning, frequency synchronization
- Optimized size through advanced architecture, < 200mm² component area
- ISO 26262 software

Other applications

- Central compute, zone, domain controllers and telematics

PF09 Functional Block Diagram



Learn more about [FS5600](#) / [PF09](#) / [PF53](#) / [PF51x3](#)

Quietly powering audio systems

Key benefits

- Efficient multi-phase core supply
- PF9452 output voltages and power up sequencing optimized for i.MX 93 and LPDDR4
- PF0300 output voltages and power up sequencing optimized for SAF9000

System management

- Multiple standby modes including DDR refresh
- Advanced clock features: Pseudo random spread spectrum, frequency tuning and clock synchronization make these PMICs ideal for audio applications
- Production ready software drivers

Applications

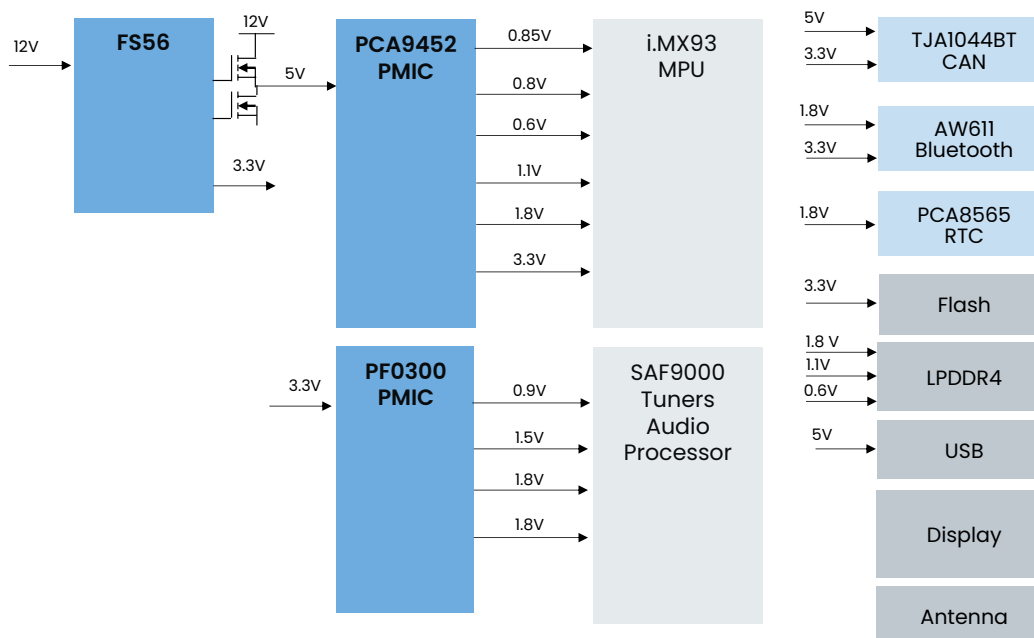
- Display audio systems
- Remote tuner
- Silver box audio
- Center stack HMI

PCA9452 Functional Block Diagram

2x VSNVS 10 mA	Logic I ² C MCU Interface Regulator Control Protection	Buck 1 & 3 Multi-PH 0.85V, 6 A
LDO 3 300 mA		Buck 2 0.6V, 3 A
LDO 4 200 mA		Buck 4 3.3V, 3 A
LDO 5 150 mA		Buck 5 1.8V, 2 A
Load Switch 400 mA	I²C Level Translator	Buck 6 1.1V, 2 A

PF0300 Functional Block Diagram

OTP Configuration	Safety Logic & Control I ² C Watchdog MCU Interface Regulator Control Fault Detection Functional Safety (ASIL-QM) Self Test	3 x Buck Multi-PH 0.5V - 3.3V 3.5 A
AMUX 32 Channels		LDO Load Switch 0.75V - 3.3V 500 mA



Learn more about [FS5600](#) / [PCA9452](#) / [PF0300](#)

Advanced driver awareness systems (ADAS)



Radar and camera sensors play an essential role for automotive ADAS to enhance road safety and increase driver convenience. NXP provides a scalable portfolio of highly integrated, safe and secure product families of MMICs, processors, SoCs and PMICs addressing increasing safety requirements.

NXP's Power Management ICs (PMICs) provide:

- Flexible safety HW state machine to fine tune system level safety concepts from ASIL B and ASIL D with same package, pinout and SW
- Several safety measures to increase system availability
- Internal self-test and protection mechanisms for robustness

Common safety systems

- Adaptive cruise control
- Autonomous emergency brake
- Blind spot detection
- Cascaded imaging radar
- Front/rear cross-traffic functions
- Lane change assistance
- Parking assist
- Radar 360° perception

NXP system solutions

Co-developed processor and PMIC for optimized system solutions with SW drivers



Radar



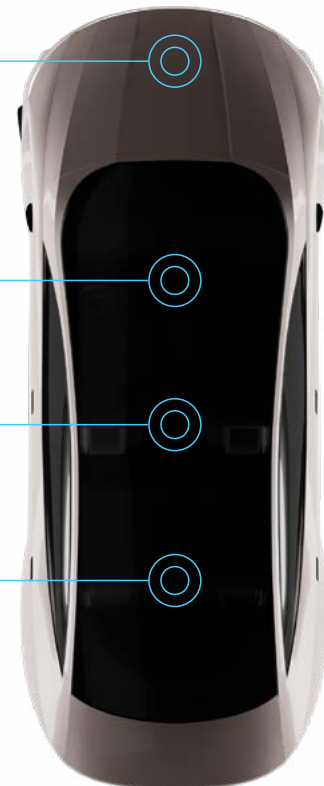
Vision



Lidar



Fusion and
central
processing



Learn more about [ADAS and Safe Driving](#)

Powering scalable radar systems

Power flexibility and scalability

- Efficient HV Buck controller with scalable output current up to 15 A
- LV Buck, boost, LDOs and load switches included to provide complete system power solution
- OTP memory selectable voltages
- Power sequencing synchronized between FS and PF devices

Leading safety concept

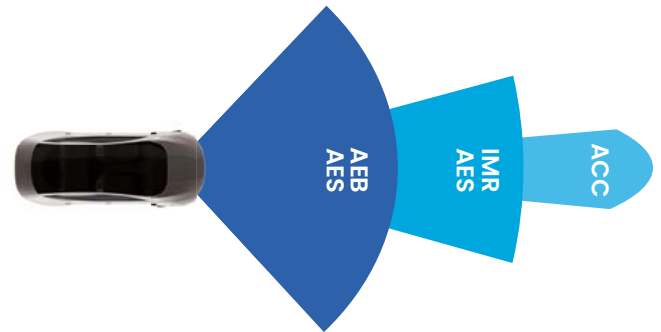
- Safety scalable (ASIL B/D)
- LBIST and latent fault monitoring with ABIST on demand
- Up to 10 inputs for external OV/UV monitoring
- External hardware fault monitoring

System management

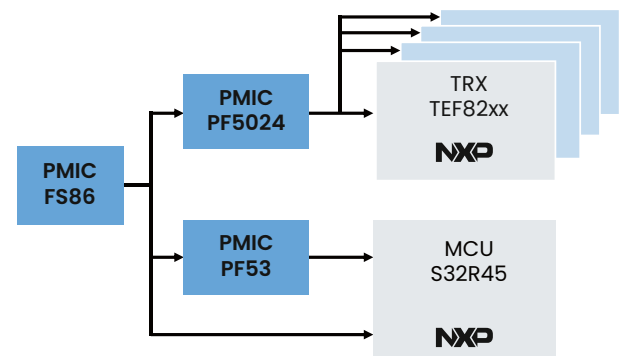
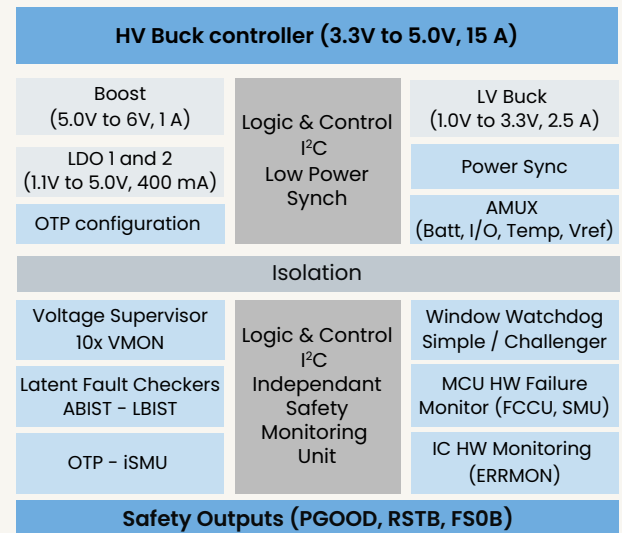
- Minimized EMC with spread spectrum, frequency tuning, frequency synchronization
- Analog multiplexer with full system voltages monitoring
- ISO 26262 software

Applications

- Adaptive cruise control
- Autonomous emergency brake
- Blind spot detection
- Cascaded imaging radar
- Front/rear cross-traffic
- Lane change assistance
- Parking assist



FS86 Functional Block Diagram



Learn more about [FS86](#)

Powering camera systems

Power flexibility and scalability

- Efficient HV Buck controller with scalable output current up to 10 A
- The PF53 core supply's AVP feature optimizes the load step response while minimizing output capacitance
- PF81-PF82 powers I/O, DDR and flash
- The PF53 and PF8250's power sequencing is synchronized with the FS84
- One-Time-Programmable (OTP) memory enables device configuration and minimizes external components

Leading safety concept

- Safety scalable (ASIL B/D)
- LBIST and latent fault monitoring with ABIST on demand
- External OV/UV monitoring
- The FS84 manages the safe-state transitions when a fault is reported

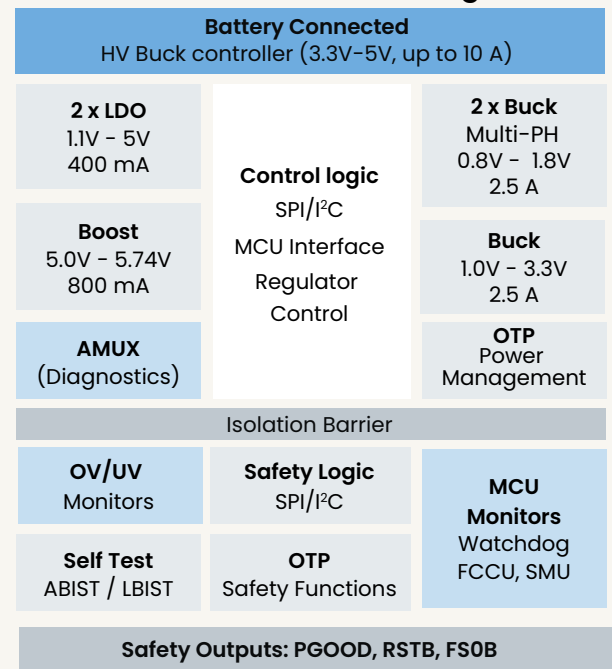
System management

- Minimized EMC with spread spectrum, frequency tuning, frequency synchronization
- Analog multiplexer with full system voltages monitoring
- ISO 26262 software

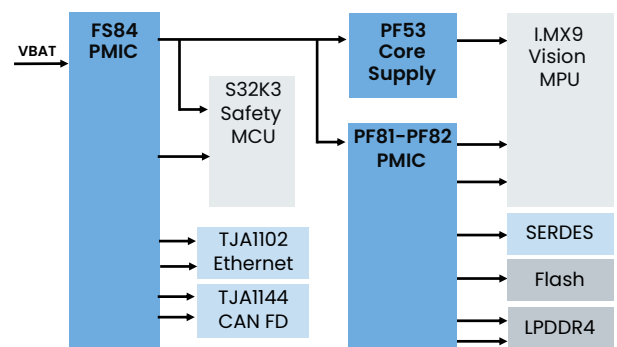
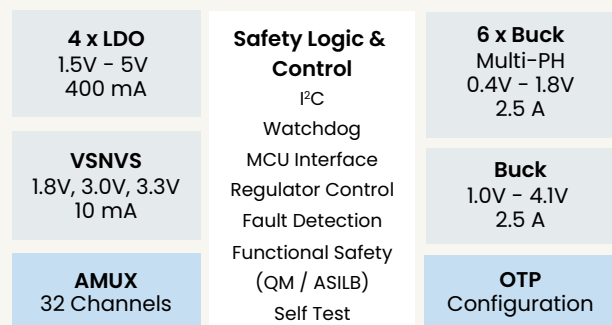
Applications

- Adaptive cruise control
- Autonomous emergency brake
- Front/rear cross-traffic

FS84 Functional Block Diagram

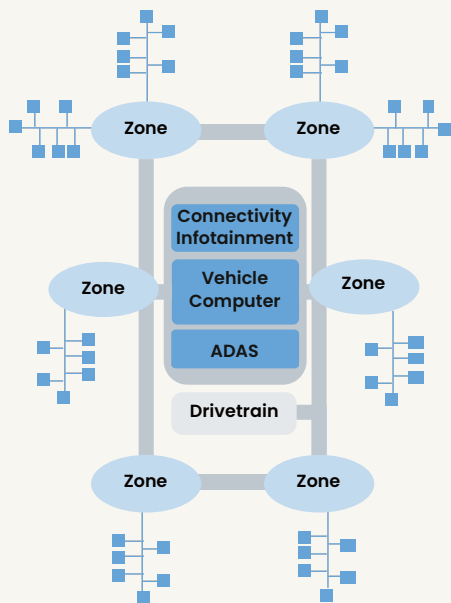


PF81/PF82 Functional Block Diagram



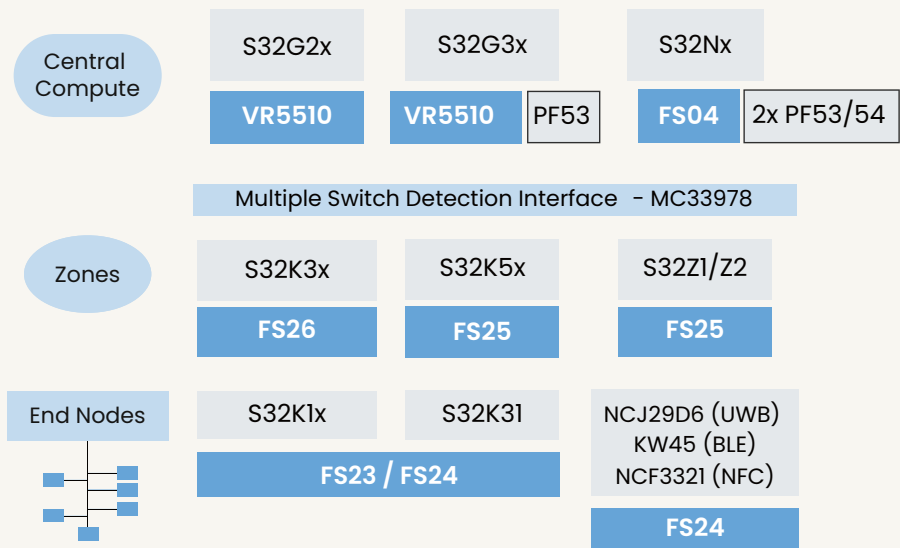
Learn more about [FS84](#) / [PF81-PF82](#)

Software-defined vehicle (SDV)



A dominant trend in new vehicle electrical architectures is the software-defined vehicle (SDV). Functionality, system behavior and feel are developed in code, rather than by mechanical systems. The benefits to this approach are features can be updated and added based on customer preferences. Software updates are made through over-the-air (OTA) updates. A common implementation of the SDV includes a central compute module, a few zone modules and several edge modules all connected by high-speed Ethernet and CAN communications.

SDV power management solutions



Learn more about [Software-Defined Vehicle](#)

Software-defined vehicle (Central compute)

The NXP central compute solution is based on the new S32N vehicle processor, with innovative FS04, PF53 system power management and integrated software from the NXP CoreRide platform. The S32J100 Ethernet SoC powered by the FS25 provides a comprehensive Ethernet data processing system.

Power flexibility and scalability

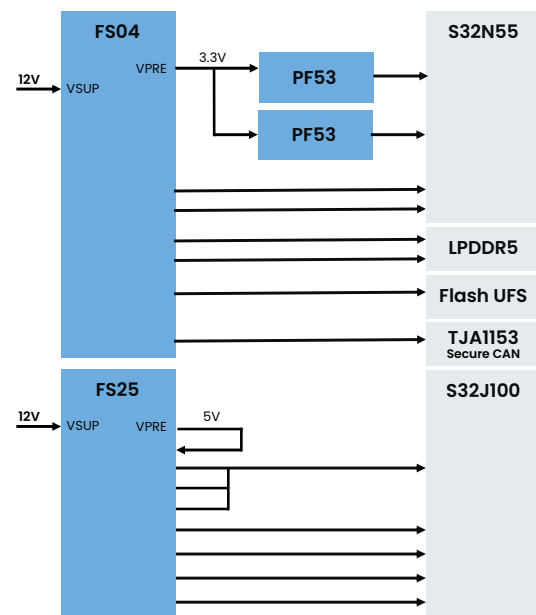
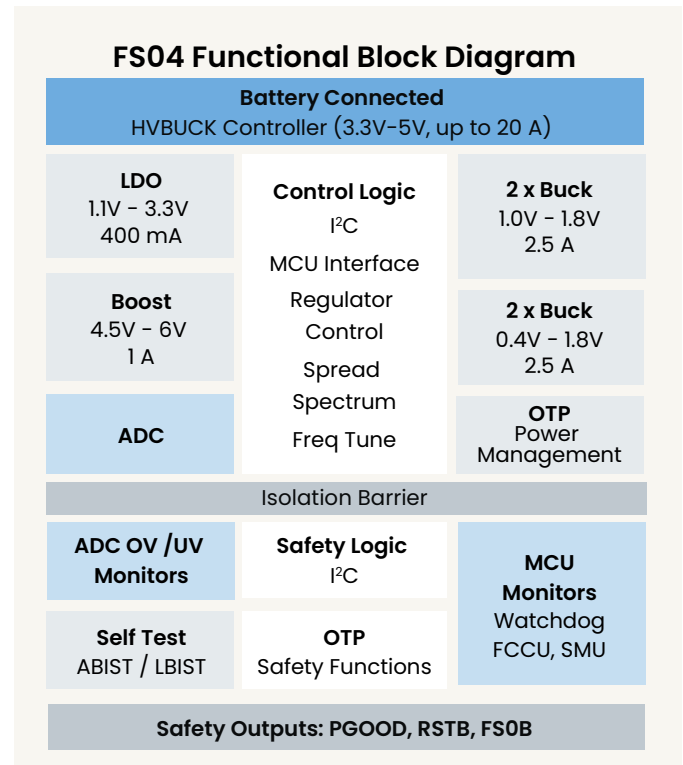
- Efficient HV Buck controller with scalable output current up to 20 A
- The PF53 core supply's AVP feature optimizes the load step response while minimizing output capacitance
- The FS25 powers the S32J Ethernet SoC and CAN ports
- The FS04, PF53 and FS25's regulators' power sequencing is synchronized by the FS04
- One-Time-Programmable (OTP) memory enables device configuration and minimizes external components

Leading safety concept

- New safety ADC provides precise external OV/UV monitoring
- Safety scalable (ASIL B/D)
- ABIST, LBIST latent fault monitoring
- The FS04 manages the safe-state transitions when a fault is reported

System management

- Main ADC provides full system voltage and temperature monitoring
- Minimized EMC with spread spectrum, frequency tuning, frequency synchronization
- ISO 26262 software
- Ideal Diode driver and Battery Switch to improve system robustness



Learn more about [FS04](#)

Software-defined vehicle (Zones)

Zone controllers are the vehicle’s bridge between the central compute system and various actuators, sensors and other end nodes of the vehicle. Depending on the vehicle’s functional partitioning, zone modules can have different levels of computing performance. The S32K5 powered by the FS25 provides a scalable solution to support mid to high-end zone computing performance.

Power flexibility and scalability

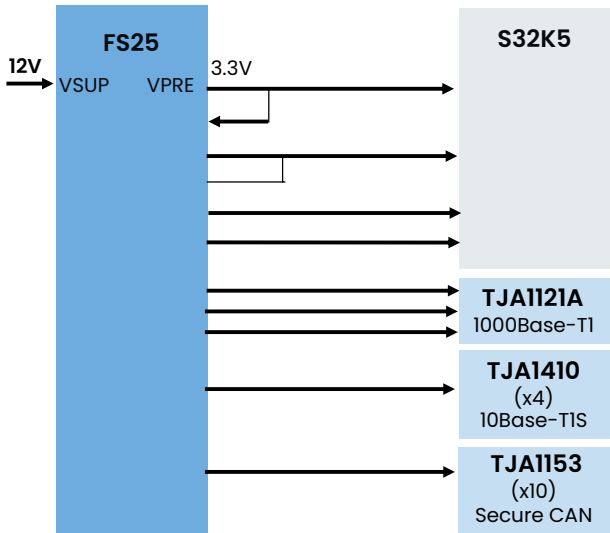
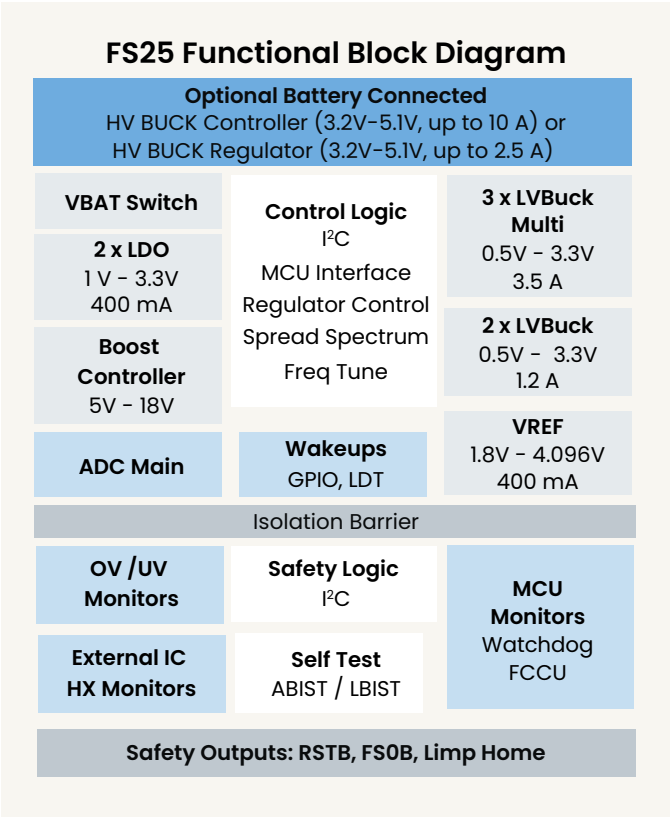
- Scalable off-battery HV Buck and multi-phase LV Bucks support a wide range of zone processing use cases
- The FS25 optimizes power density by powering the S32K5 plus the Ethernet and CAN ports
- The VBAT switch gate driver provides fault isolation
- Multiple-Time-Programmable (MTP) memory enables device configuration and minimizes external components

Leading safety concept

- New safety ADC provides precise external OV/UV monitoring
- Safety scalable (ASIL B/D)
- LBIST and latent fault monitoring with ABIST on demand
- The FS25 manages the safe-state transitions when a fault is reported

System management

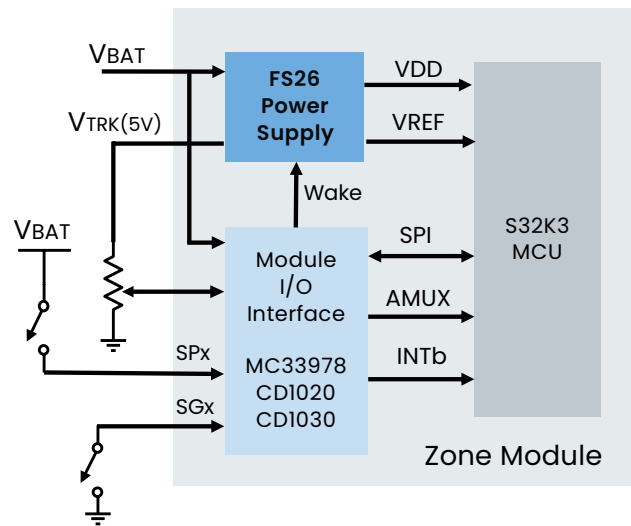
- Main ADC provides full system voltage and temperature monitoring
- Minimized EMC with spread spectrum, frequency tuning, frequency synchronization
- ISO 26262 software



Software-defined vehicle (Zones)

MSDI - Multiple Switch Detection Interface

- The MSDI interfaces to module inputs to detect switch-to-ground, switch-to-battery and analog sensor inputs
- Switch inputs are sent to the MCU over SPI
- Analog inputs are sent to MCU over AMUX output
- Cyclic low power mode can wake up on an input change of state:
 - Wake pin for LP-OFF
 - INT pin for LP-ON
- SPI register read to determine which input caused the wake up



Device Features

	MC33978A	MC33CD1020	MC33CD1030
Inputs	22	22	33
Sleep Current	30 µA	30 µA	50 µA
Temp Sensor	YES	--	YES
Battery Sensor	YES	--	YES
Wetting Current	3-bit Programmable 2 mA-20 mA	Programmable 2 mA, 8 mA, 12 mA, 16 mA	3-bit Programmable 2 mA-20 mA
Package	32 SOIC and QFN 48 LQFP	32 QFN	48 LQFP

Learn more about [Multi-Switch Detection Interfaces \(MSDI\)](#)

Software-defined vehicle (End nodes)

Powering car access systems

Power flexibility and scalability

- HV Buck with PFM low power mode
- HVLDO to power the CAN port
- One-Time-Programmable (OTP) memory enables device configuration and minimizes external components

Leading safety concept

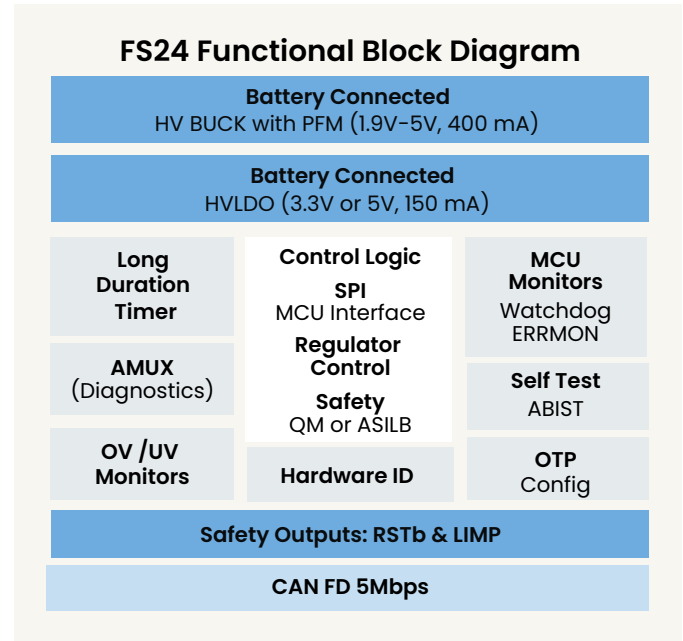
- Safety scalable (ASIL QM/ASIL B)
- Built in self-test (ABIST)
- LIMP output to increase MCU availability during faults

System management

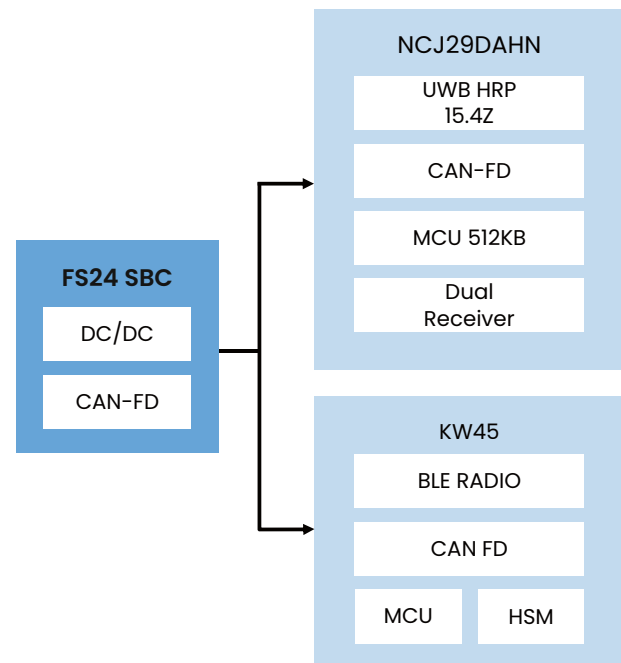
- Hardware ID feature can identify up to 9 anchors positions in the car. Identifying the anchors using this function allows a single hardware/software anchor design to be duplicated throughout the car. It results in simplifying the software design, the hardware Bill of Material (BOM) and consequently reducing the module's development cost
- Minimized EMC with spread spectrum, frequency tuning, frequency synchronization
- ISO 26262 software

Applications

- UWB anchors
- NFC anchors
- BLE anchors
- Combo anchors (UWB + BLE)
- UWB radar



Ranging & Key Connections



Software-defined vehicle (End nodes)

Powering smart motors

Power flexibility and scalability

- HV Buck with PFM low power mode
- HVLDO to power the CAN port
- HVLDO for external sensor supply
- One-Time-Programmable (OTP) memory enables device configuration and minimizes external components

Leading safety concept

- Safety scalable (ASIL QM/ASIL B)
- Built in self-test (ABIST)
- Fail-safe and limp-home outputs to increase MCU availability during faults

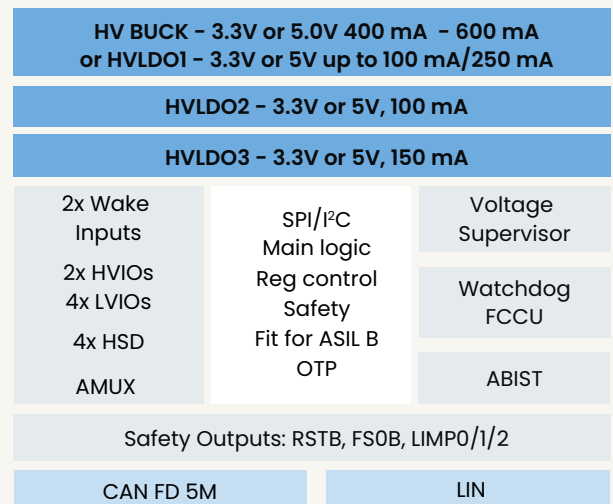
System management

- CAN and LIN built in transceivers
- Multiple I/O to interface to switch inputs, LEDs and relays
- Minimized EMC with spread spectrum, frequency tuning, frequency synchronization
- ISO 26262 software

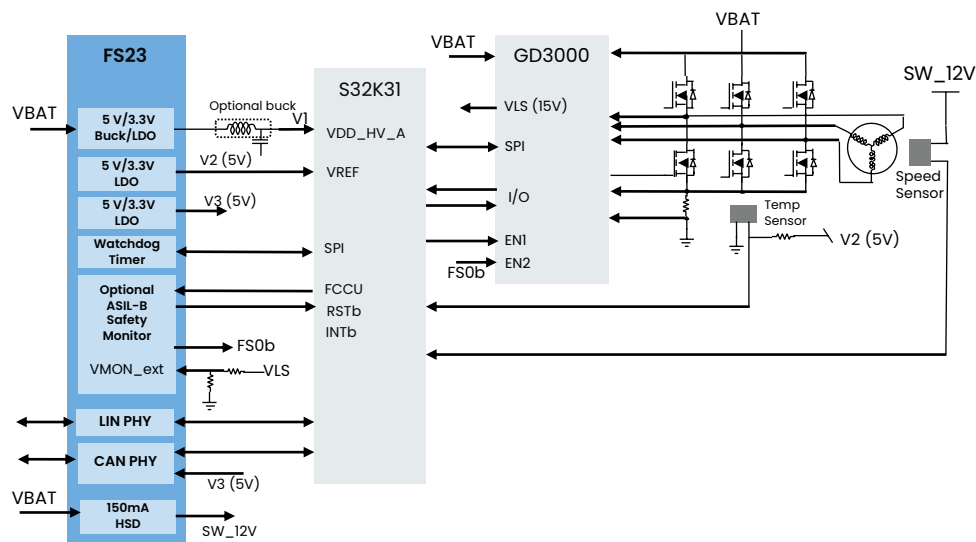
Applications

- Fuel, oil, coolant pumps
- Door and seat motors
- Window and sunroof motors
- Blower motors
- Wiper motors

FS23 Functional Block Diagram



Safely Powering BLDC Motor Drives



Learn more about [FS23](#)

Processor and PMIC solutions

	Processors	NXP PMIC solution
NXP processors	IMX6Q\6S	PF0100
	IMX8Qx	PF82 (+FS56)
	IMX8Dx	PF71 (+FS56)
	IMX93	PCA9452 (+FS56)
	IMX95	FS56+PF09+PF53
	IMXRT117X	PF5020
	LX2160	FS5600+PF5200+PF5024+PF8100
	SAF85\86	FS56+PF5103
	S32K31X\32x	FS23
	S32k33x\34x\35\36x\38x\39x	FS26
	S32G2\G3	VR5510+(PF53)
	S32Z\E	FS86+PF5030
	S32N	FS04+PF54
	S32V	FS85+PF81
	S32R2X	FS84+(PF5020)
	S32R4X	FS86+PF5103+(PF52)
Multi-vendor processors	Ambarella CV2	PF71+PF5024
	Ambarella CV22\25	FS56+PF81
	Ambarella CV3	FS86+2*PF5103
	Ambarella CV5\CV52	FS56+PF5024\PF52+PF71
	AXERA M57H	FS85+PF82
	Black Sesame A1000\A1000L	FS86\FS56+PF82
	Black Sesame C1200	PF5103+PF5030+PF82
	Cambricon SD5223	2*PF5200
	Flagchip FC7300	FS26
	Horizon J2	PF82
	Horizon J3	PF82+PF5024
	Horizon J5	FS56+PF71+PF5023+3*PF54
	Horizon J6E\M	VR5510 +3* PF54
	Horizon J6H\P	VR5510+LV PMIC
	Huixi R1	3*PF82
	Infineon TC22X\23X\27X\29X	FS45\FS65\FS26\FS85
	Infineon TC3X	FS65\FS26\FS85
	Infineon TC4X (New)	FS27 (+ PF5301 version base – T4D)
	Infineon Cypress Traveo II	FS23\FS26
	MobileEye EyeQ4	PF5020+PF5024\PF52
	MobileEye EyeQ5-Mid	PF5020+PF5024
	MobileEye EyeQ6L	FS8406 + PF5300 + PF5103
	Oritek LQ560 V200	FS85+PF82
	Renesas RH850C/D/E/F/P/U	FS23\FS45\FS65\FS26\FS27\FS85
	Renesas Rcar H3	PF82 + PF52 + 2*PF5020
	Renesas Rcar M3	2*PF82
	Renesas Rca V3	PF5020 + PF5024
	RH850U2A	FS65\FS26\FS85
	Renesas RH850U2B (New)	FS27
	SemiDrive X9HP\H\M\E and V9M	PF71\PF81+PF52
	SemiDrive V9T\X9U	PF71+2*PF52
	SemiDrive X9SP\XPS\V9	PF71+2*PF53
	SemiDrive G9V\Q\X	VR5510+PF52
	SemiDrive G9E\E34X\E36X	FS8530
	SemiDrive X9CC	2*FS56+PF81\PF71+8PF53
	ST ST58N/E	FS85\FS65\FS26
	ST STM SR6P3 / P7 (New)	FS27 (+ PF5301 version base – P7)
	TI AWR2243	FS56+PF502x
	TI C2000\TMS570\Sitara AM2x	FS65\FS26\FS85
	TI TDA2	FS56+PF81
	TI TDA4	FS56\86 + PF82 + PF52+ PF5020
	Xilinx ZU2\ZU3	FS56+PF81
	Xilinx ZU4\ZU5\ZU6\ZU7\ZU9	FS56+PF52+PF81
	Xilinx ZU11\ZU13\ZU15	FS86+PF82+PF52

Automotive power management products

	Features	FS23	FS24	FS26	VR5510	FS56	FS27 (NPI)	FS04 (NPI)
Power Management Features	VPRE HV Buck	3.3V or 5V / 0.6 A HVBUCK (internal MOS) or 3.3V or 5V / 100 mA or 250 mA HVLDO	1.9V~5V / 0.4 A (internal MOS)	3.7V~6.35V / 1.5 A (internal MOS)	3.3V~5.2V / 10 A (external MOS)	1X 1.8V~8V / 3 A (internal MOS) 1* 1.8V~7.2V / 15 A (external MOS)	3.2V~6.35V / 1.5 A or 2.5 A	3.3V~5.3V / 20 A (external MOS)
	LV Buck	--	--	0.8V~3.35V / 0.8 A or 1.65 A	2*(0.4V~1.8V / 2.5 A) up to 5 A in multiphase 1*(1V~4.1V / 2.5 A)	--	0.8V~5V / 2.5 A or 3.5 A	2*(1V~1.8V / 2.5 A) 2*(0.4V~1.8V / 2.5 A) 1*(0.6V~1.8V / 70 mA)
	Boost	--	--	HV Boost Controller 8V~18V Front / Back Mode / 1.9 A (external MOS)	Boost Converter 4.5V~6V / 1 A (internal MOS)	--	HV Boost Controller 5V~24V Front/ Back mode (external MOS)	Boost Converter 4.5V~5.5V / 1 A (internal MOS)
	LDO	1* 3.3V or 5V / 150 mA 1* 3.3V or 5V / 100 mA	3.3V or 5V / 150 mA	2*(3.3V or 5V / 400 mA)	1* 1.1V~5V / 400 mA 2*(1.5V~5V / 400 mA)	--	2*(1V~5V / 400 mA)	1* 1V or 4.1V / 400 mA
	Trackers	--	--	2*(1.2V or 1.8V or VREF or LDO2 / 150 mA)	--	--	2*(1.2V or 1.8V~5V VREF or LDO2 / 150 mA)	--
	Others	4*High Side Drivers 150 mA with cyclic sensing and PWM capability	--	0.75% Vref 3.3V or 5V / 30 mA	1*HV LDO 0.8V or 3.3V / 10 mA	--	Flyback / SEPIC mode of Vbst 0.75% Vref 1V~5V / 80 mA	Buck5 switch mode 150 mA
Safety Features	Fit for FuSa	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Watchdog	Simple	Simple	Simple / Challenger	Simple / Challenger	Simple / Challenger	Simple / Challenger	Simple / Challenger
	FCCU or MCU Error Mon	Yes	Yes	Yes (incl. PWM)	Yes	Yes	Yes	Yes
	Voltage monitor	Up to 4	Up to 3	Up to 8	Up to 7	Up to 4	Up to 8	Safety ADC up to 8
	BIST / ABIST	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Safety Output	RSTB, FS0B, LIMPO/1/2	LIMPO	FS0b, FS1b, RSTB	FS0b, PGOOD, RSTB	FS0b, PGOOD1, PGOOD2	FS0b / LIMP, FS1b, RSTB	FS0b, PGOOD, RSTB
	CRC on Communication	Yes	Yes(Option)	Yes	Yes	Yes	Yes	Yes
	IC ext Monitoring	Yes	Yes	Yes	--	Yes	Yes	--
	Documentation/ Analysis	FMEDA, Safety Manual, FIT report, FTA, DFA audit on site	FMEDA, Safety Manual, FIT report, FTA, DFA audit on site	FMEDA, Safety Manual, FIT report, FTA, DFA audit on site	FMEDA, Safety Manual, FIT report, FTA, DFA audit on site	FMEDA, Safety Manual, FIT report, FTA, DFA audit on site	--	--

Automotive power management products (cont.)

	Features	FS23	FS24	FS26	VR5510	FS56	FS27 (NPI)	FS04 (NPI)
System Features	Max operating voltage	18V	18V	18V	36V	18V	Boost Front / Back mode: 18V SEPIC Front mode: 32V Flyback Front mode: 52V	36V
	Max input voltage	40V	40V	40V	60V	36V	70V	60V
	Ambient Temp Range	-40 °C~125 °C	-40 °C~115 °C	-40 °C~125 °C	-40 °C~125 °C	-40 °C~125 °C	-40 °C~125 °C	-40 °C~125 °C
	Spread-spectrum	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Low-power Off Mode (25 °C) All Reg Off	30 µA	35 µA	30 µA	15 µA	7.5 µA	30 µA	12 µA
	Low-power On Mode (25 °C) Vpre ON / Reg could be switched On	20 µA	40 µA	32 µA	Standby mode with Vpre + HVLDO ON: 35 µA. Deep sleep mode with HVLDO on: 15 µA	74 µA	32 µA	35 µA
	GPIO	2*HVIO, 4*LVIO, 2*Wakeup, 1*INTB	HVIO1, LIMP0/GPO, 2*Wakeup, 1*INTB, HD ID	2*HV GPIO, 2*Wakeup, 1*INTB	2*PWRON, 1*INTB, 1*STBY input	3*GPIO, 2*EN	2*LV IO, 2*GPIO, 2*Wakeup, 1*INTB	2*PWRON, 4*GPIO, 1*INTB, 1*STBY input, 1*STBY_WKUP
	AMUX (battery, I/O, temp, VREF)	Yes	Yes	Yes	Yes	--	Yes	Main ADC
	Long Duration Timer	Yes	Yes	Yes	--	--	Yes	--
	Communication	SPI/I ² C	SPI	SPI	I ² C	I ² C	SPI/I ² C	I ² C
	CAN / LIN interface	1*CAN FD (optional) 1*LIN (optional)	1*CAN FD (optional)	--	--	--	--	--
	Package (mm)	48 QFN (7x7)	32 QFN (5x5)	48 LQFP EP (7x7)	56 QFN (8x8)	32 QFN (5x5)	48 LQFP EP (7x7)	64 QFN (9x9)
BYLink System Power Platform		--	--	Yes	Yes	Yes	Yes	Yes

Automotive power management products

	Features	FS45/FS65	FS5502	VR5500	FS84/85	FS84QFN48EP	FS86
Power Management Features	VPRE HV Buck	6.5V / 2.0 A Asynchronous (internal MOS)	3.3V~5V / 10 A (external MOS)	3.3V~5V / 10 A (external MOS)	3.3V~5V / 10 A (external MOS)	3.3V~5V / 10 A (external MOS)	3.3V~5 / 15 A with HS short-circuit protection (external MOS)
	LV BUCK	FS45 Vcore LDO 1V~5V / 500 mA or FS65 Vcore Buck 1V~5V / 0.8 A or 1.5 A or 2.2 A	1* 0.8V~1.8V / 2.5 A 1* 1V~3.3V / 2.5 A	2*(0.8V~1.8V / 2.5 A) up to 5 A in multiphase 1* 1V~3.3V / 2.5 A	2*(0.8V~1.8V / 2.5 A) up to 5 A in multiphase 1* 1V~3.3V / 2.5 A	1*0.8V~1.8V / 2.5 A 1* 1V~3.3V / 2.5 A	1*1V~3.3V / 2.5 A
	Boost	Buck/Boost Topology on Vpre (external MOS)	--	Boost Converter 5V or 5.74V / 1.1 A (internal MOS)	Boost Converter 5V or 5.74V / 1.1 A (internal MOS)	Boost Converter 5V or 5.74V / 1.1 A (internal MOS)	Boost Converter 5V~6V / 1.1 A (internal MOS)
	LDO	Vcan 5V / 100 mA Vcca 3.3V or 5V / 100 mA or 300mA	1* 1.1V~5V / 400 mA	2*(1.1V~5V / 400 mA)	2*(1.1V~5V / 400 mA)	2*(1.1V~5V / 400 mA)	1*1.5V~5V / 400 mA 1*1.1V~5V / 400 mA
	Trackers	Vaux 3.3V or 5V / 400 mA (ext.PNP)	--	--	--	--	--
	Others	Vkam LDO 3.5V / 3 mA	--	--	--	--	--
Safety Features	Fit for FuSa	Yes	Yes	Yes	Yes	Yes	Yes
	Watchdog	Simple/ Challenger	--	--	Simple/ Challenge	Simple	Simple/ Challenger
	MCU Error Mon	Yes	--	--	Yes	Yes	Yes
	Voltage monitor	internal Monitoring	Up to 3	Up to 3	Up to 6	Up to 6	Up to 10
	BIST / ABIST	Yes	--	--	Yes	Yes	Yes
	Safety Output	FS0b and FS1b (option)	PGOOD, RSTB	PGOOD, RSTB	FS0b, PGOOD, RSTB	FS0b, PGOOD, RSTB	FS0b, PGOOD, RSTB
	CRC on Communication	--	Yes	Yes	Yes	Yes	Yes
	IC ext Monitoring	Yes	--	--	Yes	--	Yes
	Documentation/ Analysis	FMEDA, Safety Manual	--	--	FMEDA, Safety Manual, FIT report FTA and DFA audit on site	FMEDA, Safety Manual, FIT report FTA and DFA audit on site	FMEDA, Safety Manual, FIT report FTA and DFA audit on site

Automotive power management products (cont.)

	Features	FS45/FS65	FS5502	VR5500	FS84/85	FS84QFN48EP	FS86
System Features	Max Operating voltage	19V	36V	36V	36V	36V	36V / 18V
	Max input voltage	40V	40V	40V	60V	40V	60V / 36V
	Ambient Temp Range	-40 °C~125 °C	-40 °C~125 °C	-40 °C~125 °C	-40 °C~125 °C	-40 °C~125 °C	-40 °C~125 °C
	Spread-spectrum	--	Yes	Yes	Yes	Yes	Yes
	Low-power Off Mode (25 °C) All Reg Off	32 µA	10 µA	10 µA	10 µA	10 µA	10 µA
	Low-power On Mode Vpre ON/ Reg could be switched On	--	--	--	--	--	--
	GPIO	4*Wakeup, 2*input, 1*output, 1*INTB	2*Wakeup, 1*INTB	2*Wakeup, 1*INTB	2*Wakeup, 1*INTB	2*Wakeup, 1*INTB	2*Wakeup, 2*GPIO, 1*INTB
	AMUX (battery, I/O, temp, VREF)	Yes	--	Yes	Yes	Yes	Yes
	Long Duration Timer	Yes	--	--	--	--	--
	Communication	SPI	I ² C	I ² C	SPI/I ² C	SPI	I ² C
	CAN / LIN interface	1*CAN (optional) 1*LIN (optional)	--	--	--	--	--
	Package (mm)	48 LQFP EP (7x7)	56 QFN EP (8x8)	56 QFN EP (8x8)	56 QFN EP (8x8)	48 QFN EP (7x7)	48 QFN EP (7x7)
BYLink System Power Platform		--	Yes	Yes	Yes	Yes	Yes

Automotive power management products

	Features	PCA9452 (Auto)	PF09(NPI)	PF5020(Auto)	PF5023(Auto)
Power Management Features	Orderable part numbers	PCA9452AHNMP PCA9452AHNK PCA9452AHNE	PPF0900AMxxxES PPF0900AVxxxES	MPF5020xxxxES	MPF5023xxxxES
	Buck	2*(0.65V~2.2375V / 3 A) Dual phase 1*(0.6V~2.1875V / 3 A) 1*(0.6V~3.4V / 3 A) 2*(0.6V~3.4V / 2 A)	1*(0.5V~3.3V / 3.5 A) 4*(0.3V~3.3V / 2.5 A)	2*(0.4V~1.8V / 2.5 A) *(1V~4.1V / 2.5 A)	3*(0.4V~1.8V / 2.5 A)
	Buck-Boost/Boost	--	--	--	--
	LDO	1*(1.6V~1.9V, 3.0V~3.3V / 10 mA, always-on) 1*(0.8V~1.15V / 10 mA) 1*(1.8V~3.3V / 150 mA) 1*(0.8V~3.3V / 200 mA) 1*(0.8V~3.3V / 300 mA)	1*(1.8V~3.3V / 10 mA, always-on) 1*(0.75V~3.3V / 500 mA) 2*(0.65V~3.3V / 200 mA)	1*(1.8V/3V / 3.3V, 10 mA, always-on) 1*(1.5V~5V / 400 mA)	
	Others	1* 400 mA LS	2* 200 mA LS 1* 500 mA LS	1*LS*400 mA	
	Li-Ion Battery charger+NTC	--	--	--	--
Safety Features	Fit for FuSa	No	Yes, SIL2/AsilD	Yes, to AsilB	Yes, to AsilB
	Voltage monitor	UV	OV/UV; Ext 2 monitors; FCCU	UV/OV	UV/OV
	Watchdog	--	Window Watchdog	Simple	Simple
	ABIST/LBIST	--	ABIST/LBIST	ABIST	ABIST
	CRC on Communication	No	Yes	Yes	Yes
	Safety input/output	--	FS0B/ PGOOD	5x PGOOD	4x PGOOD
System Features	Operating Voltage	2.7V~5.5V	2.7V~5.5V	2.5V~5.5V	2.5V~5.5V
	Ambient Temp Range	-40 °C~105 °C	-40 °C~105 °C	-40 °C~105 °C/125 °C	-40 °C~105 °C/125 °C
	GPIO	1.8V / 3.3V	0.4V~5.5V	1.8V / 3.3V	1.8V / 3.3V
	I2C Level Translator	Yes	--	--	--
	32.768Khz Crystal oscillator driver	Yes	--	--	--
	AMUX	--	Yes	Yes	Yes
	Communication	I ² C	I ² C	I ² C	I ² C
	Frequency Spread-spectrum	--	Yes	Yes	Yes
	Package (mm)	HVQFN56 (8 mm x 8 mm x 0.85 mm)	HVQFN56 (8 mm x 8 mm)	HVQFN40 (6 mm x 6 mm x 0.85 mm)	HVQFN40 (6 mm x 6 mm x 0.85 mm)
Application	MCU alignment	i.MX93 Automotive	i.MX 95	i.MX RT117x	i.MX 8

Automotive power management products (cont.)

	Features	PF5024(Auto)	PF5030(Auto)	PF5103(NPI)	PF0300(NPI)
Power Management Features	Orderable part numbers	MPF5024xxxxES	PPF5030AMDA0ES	PPF5103xxxxES	PPF0300xxxxES
	Buck	4*(0.4V~1.8V / 2.5 A)	2*(0.7V~1.5V / 3.5 A with SVS and dual phase capability, up to 7 A) 1*(1V~4.1V, 2.5 A)	3*(0.5V~3.3V / 3.5V)	3*(0.5V~3.3V / 3.5 A)
	Buck-Boost/Boost	--	--	--	--
	LDO	--	2*(1.1V~4.1V / 400 mA)	1*(0.75V~3.3V / 200 mA), 1*(0.75V~3.3V / 500 mA)	1*(0.75V~3.3V / 500 mA)
	Others	--	--	--	--
	Li-Ion Battery charger+NTC	--	--	--	--
Safety Features	Fit for FuSa	Yes, to AsilB	Yes, to AsilD	Yes, to AsilB	Yes, QM
	Voltage monitor	UV/OV	UV/OV	UV/OV	UV/OV
	Watchdog	Simple	Simple/challenger	Simple/challenger	Simple
	ABIST/LBIST	ABIST	ABIST	ABIST	ABIST
	CRC on Communication	Yes	Yes	Yes	Yes
	Safety input/output	5x PGOOD	FS0B, RSTB, PGOOD	PGOOD	PGOOD
System Features	Operating Voltage	2.5V~5.5V	3.15V~5.25V	2.7V~5.5V	2.7V~5.5V
	Ambient Temp Range	-40 °C~105 °C/125 °C	-40 °C~125 °C	-40 °C~125 °C	-40 °C~+125 °C
	GPIO	1.8V / 3.3V	1.8V / 3.3V / 5.0V	1.8V / 3.3V	1.8V / 3.3V
	I2C Level Translator	--	--	--	--
	32.768Khz Crystal oscillator driver	--	--	--	--
	AMUX	Yes	Yes	No	No
	Communication	I ² C	I ² C	I ² C	I ² C
	Frequency Spread-spectrum	Yes	Yes	Yes	Yes
	Package (mm)	HVQFN40 (6 mm x 6 mm x 0.85 mm)	HVQFN40 (6 mm x 6 mm x 0.85 mm)	HWQFN28 (4.5 mm x 4.5 mm x 0.68 mm)	HWQFN28 (4.5 mm x 4.5 mm x 0.68 mm)
Application	MCU alignment	i.MX 8	S32xx	--	--

Automotive power management products (cont.)

	Features	PF5113(NPI)	PF5123(NPI)	PF5200	PF5300
Power Management Features	Orderable part numbers	PPF5113xxxxxES	PPF5123xxxxxES	MPF5200AMxxxES	MPF5300xxxxxES MPF5301xxxxxES MPF5302xxxxxES
	Buck	1*(0.8V, 0.825V, 0.9V or 1.2V / 2.6 A), 1*(1.3V, 1.5V, 1.8V, 2.3V, 2.5V, or 3.3V / 3.5 A), 1*(1.1V, 1.3V, 1.5V, 2.5V, or 3.3V / 2.6 A)	3*(0.5V~3.3V / 3.5 A)	2*(0.6V~1.2V / 8 A)	PF5300: 1*(0.5V~1.2V) / 12 A PF5301: 1*(0.5V~1.2V) / 8 A PF5302: 1*(0.5V~1.2V) / 15 A
	Buck-Boost/Boost	--	--	--	--
	LDO	1*(1.8V~3.3V / 200 mA), 1*(1.8V~3.3V / 250 mA)	--	--	--
	Others	--	--	--	--
	Li-Ion Battery charger+NTC	--	--	--	--
Safety Features	Fit for FuSa	Yes, to AsilB	Yes, to AsilB	Yes, to AsilB	Yes, to AsilD
	Voltage monitor	UV/OV	UV/OV	UV/OV	UV/OV
	Watchdog	Simple / challenger	Simple / challenger	Simple	Simple / challenger
	ABIST/LBIST	ABIST	ABIST	ABIST	ABIST / LBIST
	CRC on Communication	Yes	Yes	Yes	Yes
	Safety input/output	PGOOD	PGOOD	PGOOD	PGOOD
System Features	Operating Voltage	2.7V~5.5V	2.7V~5.5V	2.7V~5.5V	2.7V~5.5V
	Ambient Temp Range	-40 °C~+125 °C	-40 °C~+125 °C	-40 °C~125 °C	-40 °C~125 °C
	GPIO	1.8V / 3.3V	1.8V / 3.3V	1.8V / 3.3V / 5.0V	1.8V / 3.3V
	I2C Level Translator	--	--	--	--
	32.768Khz Crystal oscillator driver	--	--	--	--
	AMUX	No	No	Yes	No
	Communication	I ² C	I ² C	I ² C	I ² C
	Frequency Spread-spectrum	Yes	Yes	Yes	Avdaptive Voltage Position
	Package (mm)	HWQFN28 (4.5 mm x 4.5 mm x 0.68 mm)	HWQFN28 (4.5 mm x 4.5 mm x 0.68 mm)	FC-QFN32 (5 mm x 5 mm x 0.68 mm)	WF-QFN (3.5 mm x 4.5 mm)
Application	MCU alignment	--	--	S32R45, LX2160	S32G3

Automotive power management products (cont.)

	Features	PF7100	PF8100	PF8101	PF8121
Power Management Features	Orderable part numbers	MPF7100xxxES	MC33PF8100xxES	MC33PF8101A0ES MC34PF8101A0EP	MC32PF8121xxEP
	Buck	4*(0.4V~1.8V / 2.5 A) multiphase 1*(1V~4.1V / 2.5 A)	6*(0.4V~1.8V / 2.5 A) multiphase 1*(1V~4.1V / 2.5 A)	4*(0.4V~1.8V / 2.5 A) multiphase 2+2 1*(1V~4.1V / 2.5 A)	6*(0.4V~1.8V / 2.5 A) multiphase 2+2 1*(1V~4.1V / 2.5 A)
	Buck-Boost/Boost	--	--	--	--
	LDO	2*(0.8V~5V / 400 mA)	4*(1.5V~5V / 400 mA)	3*(1.5V~5V / 400 mA)	4*(1.5V~5V / 400 mA)
	Others	VSNVS1: (1.8V / 3.0V / 3.3V, 10 mA) VSNVS2: (0.8V / 0.9V / 1.8V, 10 mA)	VSNVS: (1.8V / 3.0V / 3.3V, 10 mA)	VSNVS: (1.8V / 3.0V / 3.3V, 10 mA)	VSNVS: (1.8V / 3.0V / 3.3V, 10 mA)
	Li-Ion Battery charger+NTC	--	--	--	--
Safety Features	Fit for FuSa	Yes, to AsilB	Yes, QM	Yes, QM	Yes, QM
	Voltage monitor	UV/OV	UV/OV	UV/OV	UV/OV
	Watchdog	Simple	Simple	Simple	Simple
	ABIST/LBIST	ABIST	No	No	No
	CRC on Communication	Yes	Yes	Yes	Yes
	Safety input/output	FSOB, PGOOD	FSOB, PGOOD	FSOB, PGOOD	FSOB, PGOOD
System Features	Operating Voltage	2.7V~5.5V	2.7V~5.5V	2.7V~5.5V	2.7V~5.5V
	Ambient Temp Range	-40 °C~105 °C	-40 °C~125 °C	-40 °C~05 °C/125 °C	-40 °C~85 °C
	GPIO	1.8V / 3.3V	1.8V / 3.3V	1.8V / 3.3V	1.8V / 3.3V
	I2C Level Translator	--	--	--	--
	32.768Khz Crystal oscillator driver	--	--	--	--
	AMUX	Yes	Yes	Yes	Yes
	Communication	I ² C	I ² C	I ² C	I ² C
	Frequency Spread-spectrum	Yes	Yes	Yes	Yes
	Package (mm)	HVQFN48 (7 mm x 7 mm x 0.85 mm)	HVQFN56 (8 mm x 8 mm x 0.85 mm)	HVQFN56 (8 mm x 8 mm x 0.85 mm)	HVQFN56 (8 mm x 8 mm x 0.85 mm)
Application	MCU alignment	i.MX 8X/XL (BSP available)	i.MX 8, i.MX 8X, i.MX 8Q, S32V, LS1043/LS1046/LA1575/LA9358/LX2160 (BSP available)	i.MX 8, i.MX 8X (BSP available)	i.MX 8, i.MX 8X (BSP available)

Automotive power management products (cont.)

	Features	PF8200/PF8250 (Auto)	PF8201 (Auto)
Power Management Features	Orderable part numbers	MC33PF8200xxES	MC33PF8201A0ES
	Buck	6*(0.4V~1.8V / 2.5 A) multiphase 4+2 1*(1V~4.1V / 2.5 A)	4*(0.4V~1.8V / 2.5 A) multiphase 2+2 1*(1V~4.1V / 2.5 A)
	Buck-Boost/Boost	--	--
	LDO	4*(1.5V~5V / 400 mA)	3*(1.5V~5V / 400 mA)
	Others	VSNS: (1.8V / 3.0V / 3.3V, 10 mA)	VSNS: (1.8V / 3.0V / 3.3V, 10 mA)
	Li-Ion Battery charger+NTC	--	--
Safety Features	Fit for FuSa	Yes, to AsilB	Yes, to AsilB
	Voltage monitor	UV/OV	UV/OV
	Watchdog	Simple	Simple
	ABIST/LBIST	ABIST	ABIST
	CRC on Communication	Yes	Yes
	Safety input/output	FSOB, PGOOD	FSOB, PGOOD
System Features	Operating Voltage	2.7V~5.5V	2.7V~5.5V
	Ambient Temp Range	-40 °C~125 °C	-40 °C~125 °C
	GPIO	1.8V / 3.3V	1.8V / 3.3V
	I2C Level Translator	--	--
	32.768Khz Crystal oscillator driver	--	--
	AMUX	Yes	Yes
	Communication	I ² C	I ² C
	Frequency Spread-spectrum	Yes	Yes
	Package (mm)	HVQFN56 (8 mm x 8 mm x 0.85 mm)	HVQFN56 (8 mm x 8 mm x 0.85 mm)
Application	MCU alignment	i.MX 8, i.MX 8X, i.MX 8Q, S32V, LS1043/ LS1046/LA1575/LA9358/LX2160 (BSP available)	i.MX 8, i.MX 8X, S32V, LS1043/LS1046/ LA1575/LA9358/LX2160 (BSP available)

PF8250 to replace PF8200 by Q1 2026