X-in-1 modular platform concept

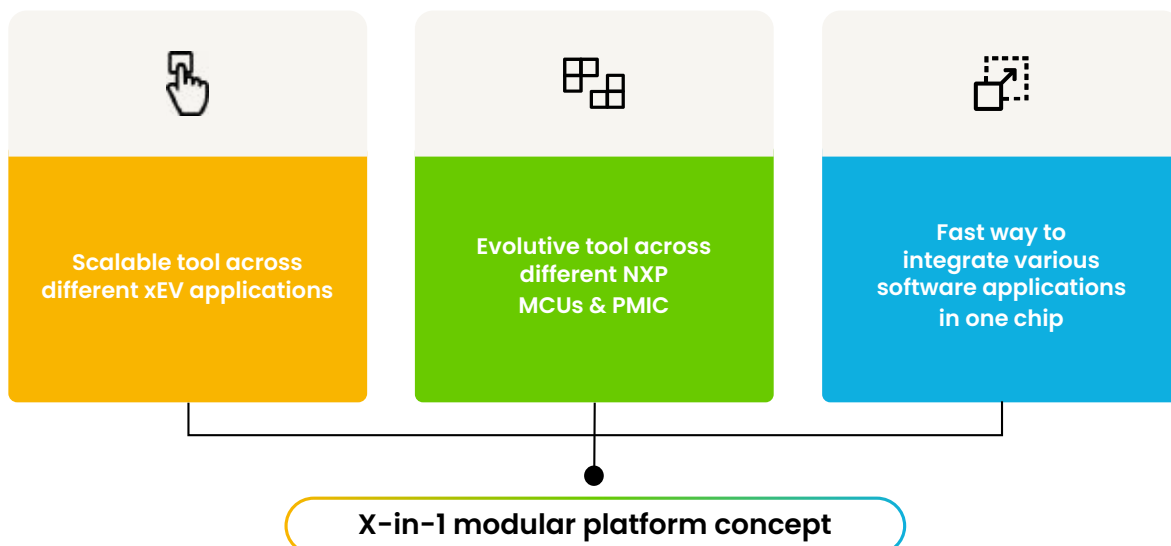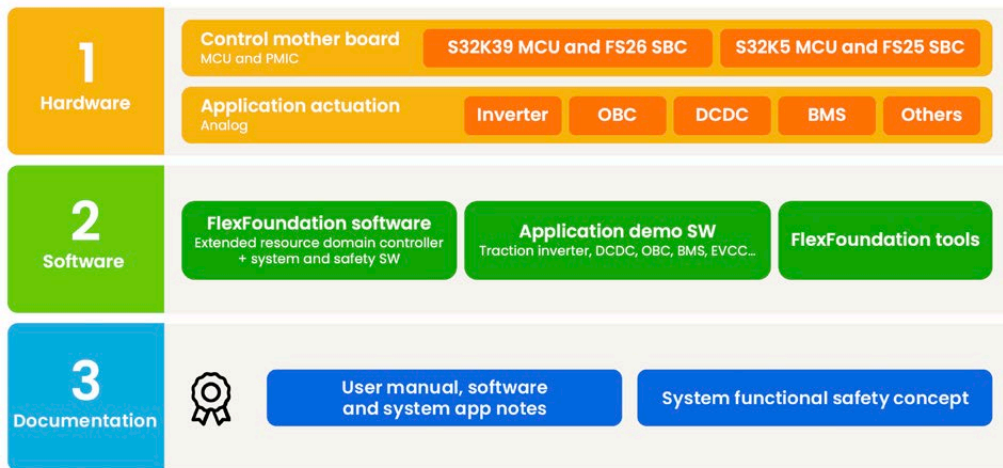## Redefining electrification integration: faster, smarter, simpler

Overview

The NXP X-in-1 modular platform redefines what's possible in electrification system integration. It delivers a scalable and evolutive hardware and software foundation that adapts to various electrification system configurations and seamlessly supports a broad range of NXP components. By enabling fast integration of multiple application software into a single NXP control chip, it simplifies X-in-1 design for automakers and Tier 1 suppliers.

This platform accelerates innovation, reduces complexity and cost and streamlines development cycles—empowering OEMs to bring advanced electrification solutions to market faster.

Scalable tool across different xEV applications

Evolutive tool across different NXP MCUs & PMIC

Fast way to integrate various software applications in one chip

X-in-1 modular platform concept

X-in-1 modular platform concept offer

1 Hardware	Control mother board MCU and PMIC	S32K39 MCU and FS26 SBC	S32K5 MCU and FS25 SBC
	Application actuation Analog	Inverter · OBC · DCDC · BMS · Others	

| 2 Software | FlexFoundation software Extended resource domain controller + system and safety SW | Application demo SW Traction inverter, DCDC, OBC, BMS, EVCC... | FlexFoundation tools |

| 3 Documentation | User manual, software and system app notes | System functional safety concept |

Key features

Scalable and evolutive hardware modular platform

- **Motherboard options:** Powered by NXP S32K39 or S32K5 MCU families, with associated SBC, enabling seamless software integration and consolidation
- **Application-specific boards:** Designed for a wide range of EV functions, integrating analog and digital components for actuation in systems such as inverter, DCDC converter, on-board charger (OBC), electric vehicle communication controller (EVCC), battery management system (BMS) and vehicle control unit (VCU).

Comprehensive software enablement

- **Flexfoundation software example:** A robust orchestration layer ensuring safe and efficient coordination across multiple applications, with built-in system management capabilities.
- **Application software (demo level):** Pre-integrated demos for key EV functions, such as field-oriented control (FoC) for inverters, BMS application software and fast control loop algorithms for DCDC converters and OBC.
- **Flexfoundation tool:** A configuration assistant for resource partitioning and multi-application orchestration, streamlining system setup and integration.

Extended documentation

X-in-1 functional safety concept and application note illustrated on a real 3-in-1 use case

- 3-in-1 use case: ASIL B OBC + ASIL C DCDC + ASIL D traction inverter
- Application note covering safe processing and isolation of multiple applications concept.
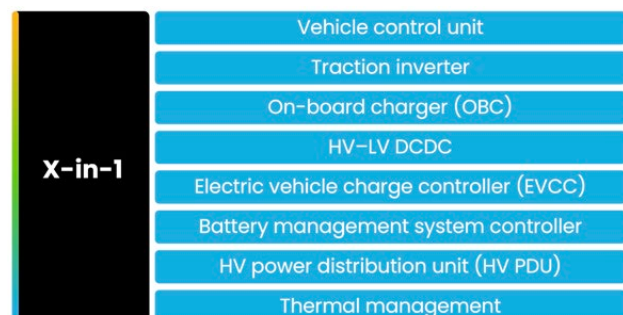
Benefits

Redefining electrification integration: faster, smarter, simpler

- **Faster time-to-market:** Accelerates development cycles with a scalable hardware and software platform that minimizes engineering effort and speeds up deployment.
- **Smarter design flexibility:** Adapts seamlessly to OEM-specific requirements, supporting dynamic resource allocation and evolving system architectures.
- **Simpler system integration:** Abstracts hardware complexity through comprehensive documentation and intuitive tools, streamlining design and implementation.

Applications

- Electrical vehicle applications

X-in-1	Vehicle control unit
	Traction inverter
	On-board charger (OBC)
	HV−LV DCDC
	Electric vehicle charge controller (EVCC)
	Battery management system controller
	HV power distribution unit (HV PDU)
	Thermal management

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