

MCX E31 microcontrollers

The MCX E31 microcontrollers (MCUs) family targets certification to IEC 61508 SIL 2, for systems up to SIL 3, supporting the development of reliable and safe industrial and IoT (IIoT) applications. With a fail-safe architecture, built-in redundancy and fault tolerance, MCX E31 simplifies the implementation of systems designed to protect both assets and lives. Develop highly dependable industrial solutions with scalable connectivity, advanced security features and a robust 5V architecture.

The MCX E31 expands on the MCX E24, featuring an improved Arm® Cortex®-M7 core running at up to 160 Mhz, supporting 3V to 5V power supplies and enhanced memory configurations with up to 4 MB of Flash and 512 kB of SRAM. These upgrades enable developers to address more demanding application that require both functional safety and higher processing performance.

Additionally, the MCX E31 offers multiple connectivity options for local networks, including CAN FD, 10/100 Mbps Ethernet with TSN and low-power serial communication, enabling seamless integration into a wide range of industrial systems.

Target applications

- HVAC
- Heat pumps, heaters
- Boilers
- Industrial power storage
- Distributed battery systems
- Electric power trains
- Factory automation
- Unmanned vehicles



Developed for IEC 61508 SIL 2 compliance

Equipped with integrated ECC on all Flash and SRAM memories, as well as internal registers for complete data integrity, the MCX E31 targets certification as an IEC 61508 with SIL 2 for hardware safety integrity and SIL 3 for systematic capability. It integrates advanced safety features such as program flow monitoring, clock and power supervision and latent fault detection. These capabilities, combined with comprehensive safety documentation, help simplify the development and certification of IEC 61508-compliant systems and related industrial safety standards. Additionally, IEC 60730 pre-certified software libraries accelerate certification processes for Class B safe appliances.

Designed and qualified for industrial applications

The MCX E31 supports robust operation on both 3V and 5V power rails, making it ideal for environments with harsh electrical noise and designs utilizing 5V sensors. Fully qualified for industrial use, it enables 24/7 operation over a 10-year lifetime and can withstand temperatures up to 135 °C.

A dedicated motor control and power management subsystem efficiently drives consumer and industrial motors with low power consumption, aided with simplified power management. It can be seamlessly paired with motor control add-on boards to explore motor control algorithms available in the MCUXpresso SDK.

Prepared for modern cybersecurity standards

The MCX E31 incorporates NXP's EdgeLock® Secure Enclave security features, featuring secure manufacturing, secure boot, secure debug access and configuration control. This dedicated security subsystem, supports both symmetric and asymmetric ciphers with side-channel protection, delivering high performance security and long-term resilience against evolving threats.

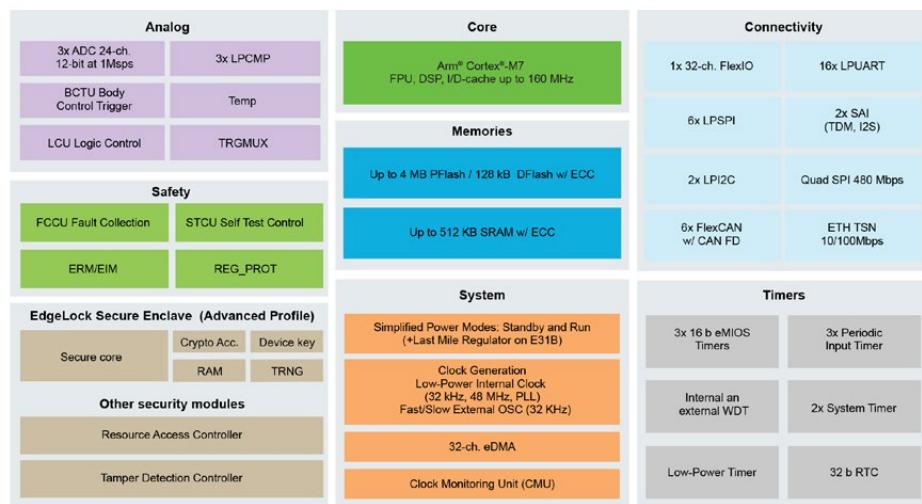
With built-in device-unique secure assets, the MCX E31 enables advanced security services such as EdgeLock 2Go for remote trust provisioning and in-field lifecycle management, helping reduce total cost of ownership.

Developer experience

The MCX MCU portfolio is supported by the MCUXpresso Developer Experience to optimize, ease and help accelerate embedded system development.

The MCUXpresso suite includes tools for simple device configuration and secure programming. Developers can choose multiple IDEs including MCUXpresso for Visual Studio Code, MCUXpresso IDE, IAR or Keil.

MCX E31 Family block diagram



NXP provides drivers and middleware with extensive examples and support for a range of RTOS choices, further complemented by a wide range of compatible middleware from NXP's partner ecosystem, allowing rapid development of a broad range of end applications.

Hardware platforms

For quick prototyping, we offer our low-cost, compact and scalable FRDM development boards. Developers have easy access to additional tools like our [Expansion Board Hub](#) for add-on boards and the [Application Code Hub](#) for software examples through the FRDM Ecosystem.

Explore our entire FRDM platform of MCUs and MPUs at nxp.com/FRDM.

MCX E31 Family part numbers

Part number	Cortex-M33 fmax (MHz)	Flash (KB)	SRAM (KB)	CAN-FD	Ethernet TSN	QSPI	Packages
MCXE315MLF	120	512	64	3	No	No	LQFP48
MCXE315MPA	120	512	64	3	No	No	HDQFP100
MCXE316MLF	120	1024	128	3	No	No	LQFP
MCXE316MPA	120	1024	128	3	No	No	HDQFP100
MCXE317MPA	120	2048	192	6	No	No	HDQFP100
MCXE317MPB	120	2048	192	6	No	No	HDQFP172
MCXE31BMPB	160	4096	512	6	Yes	Yes	HDQFP172
FRDM-MCXE31B	MCX E31B FRDM development board						HDQFP172