MCX A3 Family Microcontrollers

Mixed-Signal Architecture with Rich Analog, Optimized for Motor Control

The MCX A3 Family mixed-signal microcontrollers (MCUs) support a broad range of applications requiring high-speed performance and high-resolution analog capabilities. Built on the Arm® Cortex®-M33 core and operating at up to 240 MHz, these MCUs combine high integration with enhanced analog functionality to deliver performance and flexibility across edge designs.

An optimized Math Acceleration Unit (MAU) enables ultra-fast trigonometric calculations, offering powerful compute capabilities for high-speed control applications. A rich set of on-chip analog features minimizes the need for external components, streamlining system design and reducing costs.

SmartDMA, a dedicated co-processor, adds further versatility by executing instruction code, mathematical operations, data manipulation, and control logic—enabling efficient implementation of functions such as keypad scanning, parallel camera interfaces, and endian conversion. The low-power cache improves system performance and includes built-in RAM self-test support for safety-related designs.

The MCX A3 Family also includes intelligent peripherals such as advanced PWM timers with deadband insertion, a 3.2 Msps 16-bit ADC with windowing and averaging, and integrated operational amplifiers for efficient signal processing. With a range of package options, designers benefit from simpler board layouts and reduced BOM costs—making MCX A3xx an ideal choice for scalable, cost-effective edge solutions.

Target applications

Power and energy

- HVAC control
- Smart circuit breaker
- Solar inverter
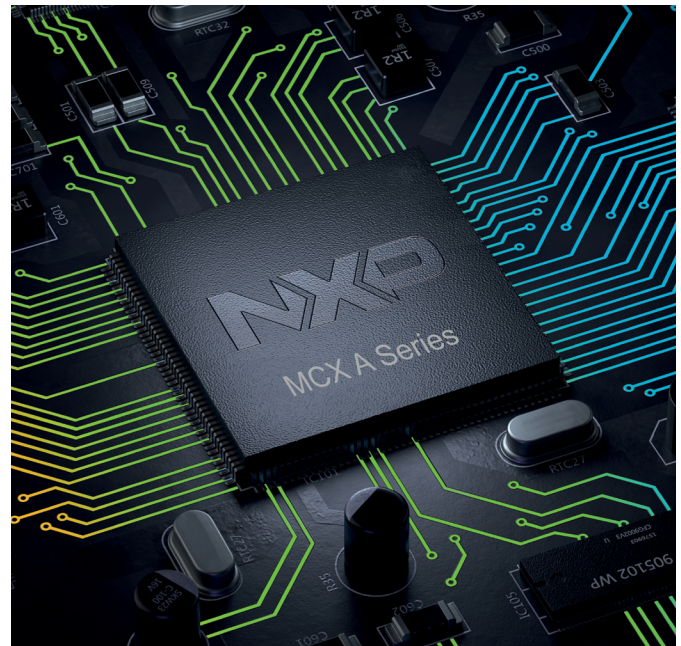
Factory automation

- Water pump
- AC motor drive
- Process control
- Instruments and meters

Home and building

- Appliances motor control
- Induction cooker
- Building control
- Fan control

General embedded

- Medical pump
- Power tools
- Drones and mobile robots

Developer experience

The MCX MCU portfolio is supported by the MCUXpresso Developer Experience to optimize, ease and help accelerate embedded system development.
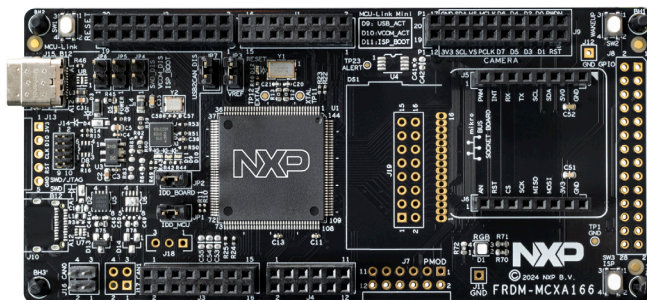
The MCUXpresso suite includes tools for simple device configuration and secure programming. Developers can choose to work with multiple IDEs including MCUXpresso for VS Code, MCUXpresso IDE, IAR, or Keil.

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.
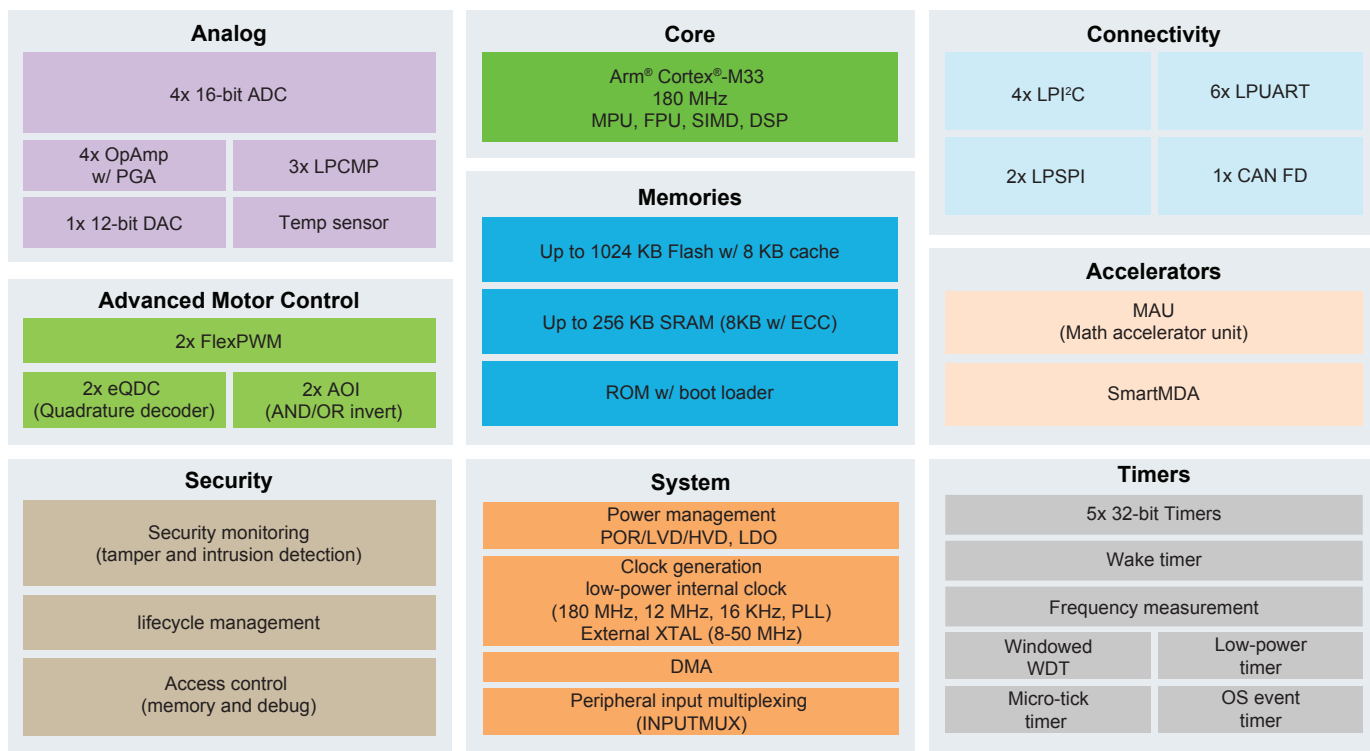
Hardware platforms

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 MCUXpresso Developer Experience.

FRDM-MCXA346 FRDM board

MCX A3 Family block diagram

Analog

4x 16-bit ADC	
4x OpAmp w/ PGA	3x LPCMP
1x 12-bit DAC	Temp sensor

Advanced Motor Control

2x FlexPWM	
2x eQDC (Quadrature decoder)	2x AOI (AND/OR invert)

Security

Security monitoring (tamper and intrusion detection)
lifecycle management
Access control (memory and debug)

Core

Arm® Cortex®-M33
180 MHz
MPU, FPU, SIMD, DSP

Memories

Up to 1024 KB Flash w/ 8 KB cache
Up to 256 KB SRAM (8KB w/ ECC)
ROM w/ boot loader

System

Power management POR/LVD/HVD, LDO
Clock generation low-power internal clock (180 MHz, 12 MHz, 16 KHz, PLL) External XTAL (8-50 MHz)
DMA
Peripheral input multiplexing (INPUTMUX)

Connectivity

4x LPI²C	6x LPUART
2x LPSPI	1x CAN FD

Accelerators

MAU (Math accelerator unit)
SmartMDA

Timers

5x 32-bit Timers	
Wake timer	
Frequency measurement	
Windowed WDT	Low-power timer
Micro-tick timer	OS event timer

MCX A3 Family MCU Options

Part Number	Frequency	Flash (KB)	RAM	LPI2C	LPUART	LPSPI	I3C	USB FS	FlexIO	CAN with FD	16b SE ADC	12b DAC	OpAmp	FlexPWM	Comparator	Seg-LCD	Tamper DET	Secure System	GPIOs	Package
MCXA346VLQ	180 MHz	1024	256	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	114	LQFP144
MCXA346VLL	180 MHz	1024	256	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	86	LQFP100
MCXA346VLH	180 MHz	1024	256	4	6	2	–	–	–	1	4	1	3	2	3	–	Y	Lifecycle Control	55	LQFP64
MCXA346VPN**	180 MHz	1024	256	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	114	WFBGA169
MCXA345VLQ	180 MHz	512	128	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	114	LQFP144
MCXA345VLL	180 MHz	512	128	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	86	LQFP100
MCXA345VLH	180 MHz	512	128	4	6	2	–	–	–	1	4	1	3	2	3	–	Y	Lifecycle Control	55	LQFP64
MCXA345VPN**	180 MHz	512	128	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	114	WFBGA169
MCXA344VLL*	180 MHz	256	64	2	4	2	–	–	–	1	2	–	3	2	3	–	–	Lifecycle Control	86	LQFP100
MCXA344VLH*	180 MHz	256	64	2	4	2	–	–	–	1	2	–	3	2	3	–	–	Lifecycle Control	55	LQFP64
MCXA344VLF*	180 MHz	256	64	2	4	2	–	–	–	1	2	–	3	2	3	–	–	Lifecycle Control	41	LQFP48
MCXA344VFM*	180 MHz	256	64	2	4	2	–	–	–	1	2	–	1	2	3	–	–	Lifecycle Control	29	HVQFN32
MCXA343VLL*	180 MHz	128	32	2	4	2	–	–	–	1	2	–	3	2	3	–	–	Lifecycle Control	86	LQFP100
MCXA343VLH*	180 MHz	128	32	2	4	2	–	–	–	1	2	–	3	2	3	–	–	Lifecycle Control	55	LQFP64
MCXA343VLF*	180 MHz	128	32	2	4	2	–	–	–	1	2	–	3	2	3	–	–	Lifecycle Control	41	LQFP48
MCXA343VFM*	180 MHz	128	32	2	4	2	–	–	–	1	2	–	1	2	3	–	–	Lifecycle Control	29	HVQFN32
MCXA356VLQ*	240 MHz	1024	256	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	114	LQFP144
MCXA356VLL*	240 MHz	1024	256	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	86	LQFP100
MCXA356VLH*	240 MHz	1024	256	4	6	2	–	–	–	1	4	1	3	2	3	–	Y	Lifecycle Control	55	LQFP64
MCXA356VPN**	240 MHz	1024	256	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control	114	WFBGA169
MCXA355VLQ*	240 MHz	512	128	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control Enhanced Security	114	LQFP144
MCXA355VLL*	240 MHz	512	128	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control Enhanced Security	83	LQFP100
MCXA355VLH*	240 MHz	512	128	4	6	2	–	–	–	1	4	1	2	2	3	–	Y	Lifecycle Control Enhanced Security	52	LQFP64
MCXA355VPN**	240 MHz	512	128	4	6	2	–	–	–	1	4	1	4	2	3	–	Y	Lifecycle Control Enhanced Security	114	WFBGA169
MCXA366VLQ*	240 MHz	1024	256	4	6	2	1	1	1	2	4	1	4	2	3	1	Y	Lifecycle Control Enhanced Security	114	LQFP144
MCXA366VLL*	240 MHz	1024	256	4	6	2	1	1	1	2	4	1	4	2	3	1	Y	Lifecycle Control Enhanced Security	83	LQFP100
MCXA366VLH*	240 MHz	1024	256	4	6	2	1	1	1	2	4	1	2	2	3	1	Y	Lifecycle Control Enhanced Security	52	LQFP64
MCXA366VPN**	240 MHz	1024	256	4	6	2	1	1	1	2	4	1	4	2	3	1	Y	Lifecycle Control Enhanced Security	114	WFBGA169
MCXA365VLQ*	240 MHz	512	128	4	6	2	1	1	1	2	4	1	4	2	3	1	Y	Lifecycle Control Enhanced Security	114	LQFP144
MCXA365VLL*	240 MHz	512	128	4	6	2	1	1	1	2	4	1	4	2	3	1	Y	Lifecycle Control Enhanced Security	83	LQFP100
MCXA365VLH*	240 MHz	512	128	4	6	2	1	1	1	2	4	1	2	2	3	1	Y	Lifecycle Control Enhanced Security	52	LQFP64
MCXA365VPN**	240 MHz	512	128	4	6	2	1	1	1	2	4	1	4	2	3	1	Y	Lifecycle Control Enhanced Security	114	WFBGA169

*: Part is planned to launch in Q4 2025

** Part is planned to launch in May 2026

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