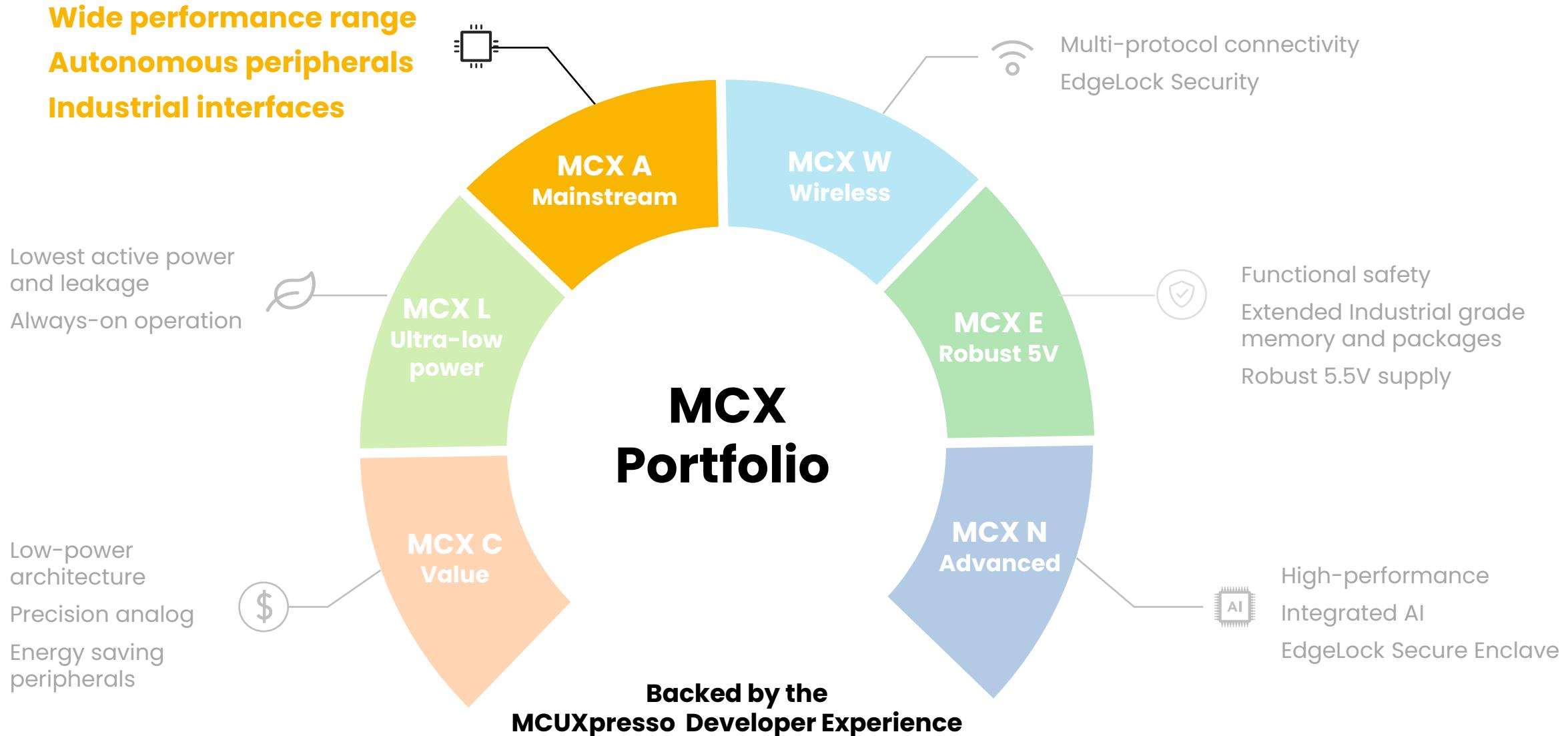




MCX A Series

Mainstream MCUs with scalable device options, low power and intelligent peripherals

MCX MCUs – One portfolio, addressing numerous application needs





MCX A Series Mainstream

Purpose-built for industrial and IoT real-time control

Real-time efficiency

Efficient Cortex-M33 at up to **1000 CoreMark**

Internal cache for fast memory access

Math Acceleration for **17x** faster trig. operation than CMSIS-DSP

Autonomous peripherals

Flexible PWM with motor control subsystem

Fast interface for serial comms, CAN, USB, Ethernet, LCD, etc.

Rich analog integration with up to 4x 16-bit ADC

Low power

Runtime efficiency as low as **53uA/MHz**

Various low power modes down to **0.4uA** with RAM retention

Low-power peripherals to offload main CPU

Scalable portfolio

Flash memory options from **64KB** to **1MB** with pin compatibility

Wide range of package options offering from **32 to 169 pins**

Unified core architecture

15 years longevity, extended industrial qualification



- Security offerings
- SESIP level 2/3*
- Secure boot



- Functional Safety certification target
- IEC 60730 Class B*
- IEC 61508 SIL2 systematic capability*

MCX A enables **advanced motor control**

Highly-integrated analog and PWM

- High-speed 16-bit ADC with synchronized sampling in each PWM period
- Can trigger 2x ADCs as a differential pair
- Up to 4x fast OpAmps for current sampling

Math Acceleration Unit (MAU)

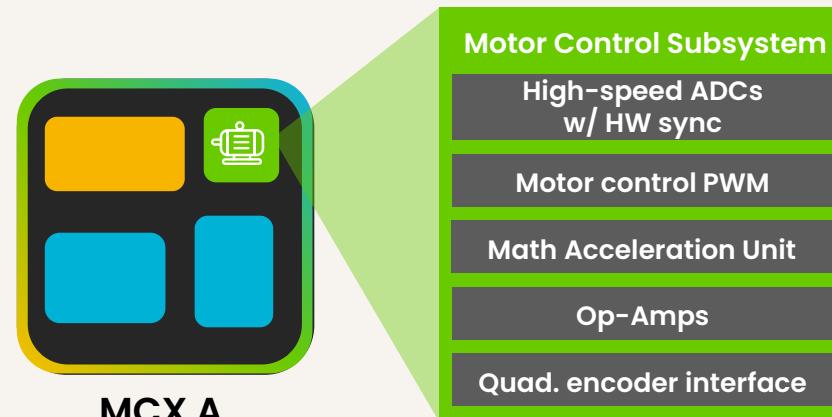
- Accelerates $\text{Sin}(x)$, $\text{Cos}(x)$, $\text{Tan}(x)$, $\text{Sqrt}(x)$, $1/\text{Sqrt}(x)$, $1/x$ in fixed/floating type
- Up to 17x faster operation than CMSIS-DSP
- Shortens control loop for FOC

Streamlined developer experience

- Motor control real-time tuning tool
- Motor control software library delivered by SDK with advanced FOC algorithms
- Quick hardware evaluation with FRDM board

Motor control subsystem

unified IPs made for motor control



Motor control highlights

- Highly dynamic control
- Optimized application cost
- Unified motor control IPs
- Use-case specific solutions
- AI/ML predictive maintenance
- Rapid time-to-market

MCX A target applications

Sensing &
data acquisition

Motor control

Interface & HMI

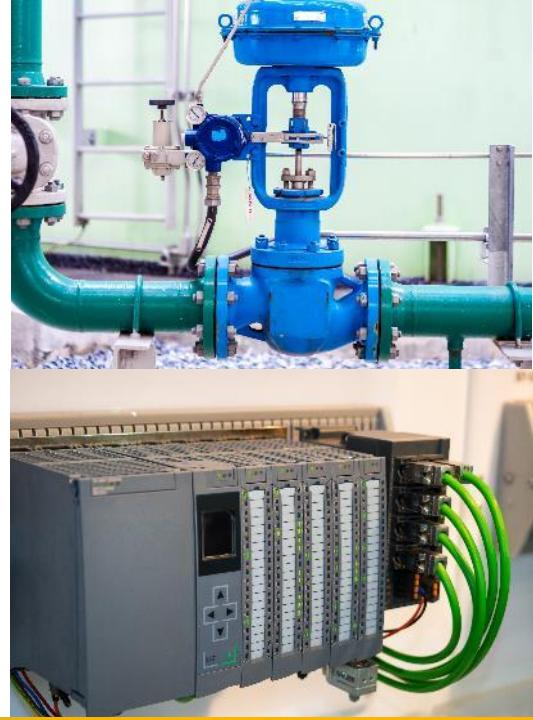
Power & Energy

- HVAC control
- Smart circuit breaker
- Solar inverter
- Edge Nodes



Factory Automation

- Water pump
- AC motor drive
- Process control
- Instruments and meters
- Sensor gateway
- Simple LCD panel



Home & Building

- Appliances motor control
- Appliance cap touch interface
- Induction cooker
- Building control
- Fan control
- Smart lighting



General Embedded

- Medical pump
- Healthcare device
- Power tools
- Drones and mobile robots



MCX A series highlights

Performance

- Boosting main frequency to 240MHz, with 984 CoreMark (4.10 CoreMark/MHz)
- MAU (Math Accelerator Unit), only 5 cycles for SIN/COS/SQRT/RECIP/ATAN, enhances the computational performance in trig functions
- Up to 1MB Flash, 256KB SRAM, and 8 KB SRAM with ECC

EdgeLock® security

- EdgeLock accelerator for TRNG, PKC, AES-256, SHA-2, and RSA
- Secure installer supporting secure boot
- Security monitoring with tamper & intrusion detection
- PQC

Communication Peripherals

- FS USB 2.0, 2xLPSPI, Up to 4xLPI2C,
- Up to 6xLPUART, I3C, FlexIO, Up to 2x FlexCAN w/ FD

Optimized innovation

- FRO180M with 1% accuracy in room temperature and 1.5% in full temperature
- LPUART providing 24MHz communication, with TX/RX swap



MCX A

Arm® Cortex®-M33

Advanced motor control

- Up to 2x FlexPWM, generate 8 complementary PWM pairs with dead zone insertion
- 2x eQDC (enhanced Quadrature Detector Controller)
- 2x AND/OR Invert



Low power and intelligent peripherals

- SmartDMA, co-processor for flexible applications
- 5xCTimer generate total 15 PWM with duty cycle adjustable
- 4x44 Segment LCD



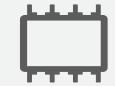
Packages

- LQFP 144/100/64/48
- HVQFN 48/32
- BGA 169/112/64
- Pin to pin compatible within MCX A



Rich Analog

- Up to 4x 16bit 3.2Msps ADC, up to 82ch on a dedicated package
- Up to 4x OpAmp
- 12bit DAC
- 3x Analog comparator



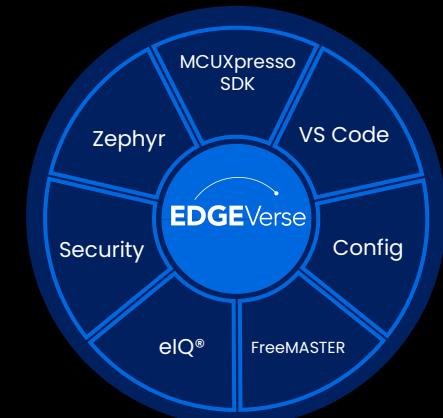
FRDM to innovate

Open-source developer ecosystem

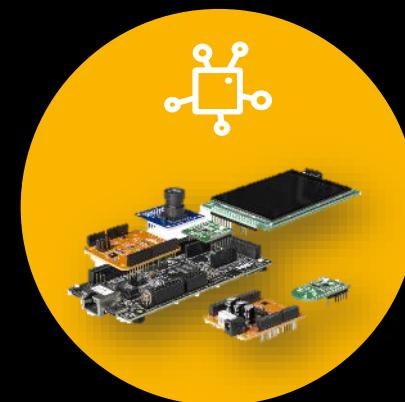
- Comprehensive software and tools for rapid development
- Modular, quick-start FRDM & [expansion boards](#) with open design files and schematics
- Access 170+ code snippets and tutorials through our [Application Code Hub](#)

Ease development for reduced time to market

Software & tools



Modular hardware



Application Code Hub



Summary



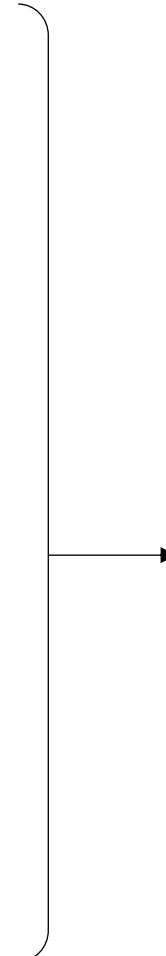
Scalability & balanced performance



Intelligent & autonomous peripherals



MCUXpresso developer experience



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www.nxp.com/MCUXpresso

www.nxp.com/FRDM