32-bit MCUs

ColdFire+ MCUs

Design innovation. Accelerated.

ColdFire+ Qx Family Target Applications

- Wireless sensor nodes
- Security control pads
- Video game accessories
- **MCF51QU**: 12-bit ADC
- **MCF51QM**: Encryption, 16-bit ADC
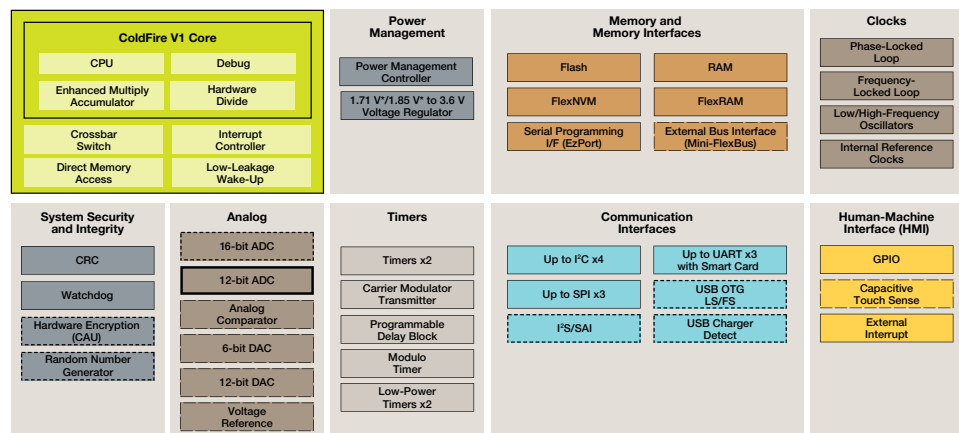
ColdFire+ Jx Family Target Applications

- Smartphone accessories
- USB audio bridges
- PC peripherals
- High-end remote controls
- **MCF51JU**: USB OTG, 12-bit ADC
- **MCF51JF**: USB OTG, 12-bit ADC encryption
- **MCF51JG**: USB OTG, encryption

Overview

Freescale ColdFire+ 32-bit MCUs are built from the ColdFire V1 core and enabled by innovative 90 nm thin-film storage (TFS) flash technology with 32 KB of FlexMemory (2 KB of EEPROM). The portfolio is defined by five families that scale from 32 to 256 KB of flash, featuring incredible ultra-low-power capabilities in small footprint solutions. ColdFire+ MCUs offer a rich combination of additive peripherals, including USB, high-performance mixed-signal capabilities, hardware encryption, an innovative touch-sensing interface and more. These key features make ColdFire+ MCUs ideal for portable handheld devices, wireless nodes, peripherals that require device authentication, building control security pads and advanced remote control devices.

The five scalable ColdFire+ families consist of the MCF51QU, MCF51QM, MCF51JU, MCF51JF and MCF51JG devices. The ColdFire+ MCF51JF, MCF51JU, MCU51QU and MCF51QM families are software and pin compatible. The ColdFire+ Qx family is an incredibly cost-effective, ultra-low-power, mixed-signal MCU family ideal for secure portable or battery-powered applications. For portable consumer devices, the ColdFire+ Jx family adds USB OTG capability and a synchronous audio interface to the ColdFire+ Qx family.

ColdFire+ Jx/Qx Families

ColdFire V1 Core		Power Management	Memory and Memory Interfaces		Clocks
CPU	Debug	Power Management Controller	Flash	RAM	Phase-Locked Loop
Enhanced Multiply Accumulator	Hardware Divide	1.71 V*/1.85 V* to 3.6 V Voltage Regulator	FlexNVM	FlexRAM	Frequency-Locked Loop
Crossbar Switch	Interrupt Controller		Serial Programming I/F (EzPort)	External Bus Interface (Mini-FlexBus)	Low/High-Frequency Oscillators
Direct Memory Access	Low-Leakage Wake-Up				Internal Reference Clocks

System Security and Integrity	Analog	Timers	Communication Interfaces		Human-Machine Interface (HMI)
CRC	16-bit ADC	Timers x2	Up to I²C x4	Up to UART x3 with Smart Card	GPIO
Watchdog	12-bit ADC	Carrier Modulator Transmitter	Up to SPI x3	USB OTG LS/FS	Capacitive Touch Sense
Hardware Encryption (CAU)	Analog Comparator	Programmable Delay Block	I²S/SAI	USB Charger Detect	External Interrupt
Random Number Generator	6-bit DAC	Modulo Timer			
	12-bit DAC	Low-Power Timers x2			
	Voltage Reference				

* 1.71 V (JF, JU, QU, QM), 1.85 V (JG)

- Only on JF, QM, JG
- Only on QM
- Only on JF, JU, QU
- Only on JF, JU, JG
- Only on JF, JU, QU, QM

Software and Development Tools

ColdFire+ MCUs offer one of the most comprehensive enablement bundles in the industry. Software and development tools include the Freescale Tower System TWR-MCF51QM, TWR-MCF51JF and TWR-MCF51JG, a rapid-prototyping hardware development tool, complimentary MQX™ RTOS with USB stacks and USB audio support available with full source code, as well as the Eclipse™ based CodeWarrior Development Studio for Microcontrollers IDE with Processor Expert.

ColdFire+ Jx/Qx MCUs Features and Benefits

Features	Benefits
Innovative FlexMemory: Configurable as EEPPROM or flash	• Eliminates the need for external EEPROM with over 4M write/erase cycles
Up to 10 flexible ultra-low-power modes	• Run current down to 260 uA/MHz • 4 µs wake-up time • Stop currents down to ~1 uA
Security and reliability	• Crypto acceleration unit and random number generator accelerate secure communication and device authentication • 32-bit hardware CRC included for system/software reliability
Integrated capacitive touch sensing and display support (Available on all but JG and QW families)	• Low-power touch-sensing interface allows wake-up from touch in lowest power modes • External bus interface to seamlessly connect to graphical displays
Flexible and powerful mixed signal capability (Available on all but JG and QW families)	• 16-bit ADC enables highly accurate measurements for instrumentation, metering and medical devices • Integrated 12-bit DAC, high-speed comparator and voltage reference to reduce system costs
Designed for space-constrained applications	• Package sizes as small as 5 x 5 mm
Connect via USB for battery charging (Jx only)	• Integrated USB 2.0 Full-Speed device/host/OTG controller with integrated transceiver and USB voltage regulator • Includes device charge detector and regulator to support battery charging via USB for portable devices
Enable audio in your application (Jx only)	• Synchronous audio interface provides direct interface to codecs and I²S audio devices • 48-bit enhanced multiply accumulate unit offers powerful signal processing capability

Package Options

64 LQFP (10 x 10)	48 LQFP (7 x 7)	44 Laminate QFN PGA (5 x 5)	64 Laminate QFN PGA (9 x 9)	32 QFN (5 x 5)
128 KB Flash	64 KB Flash	32 KB, 64 KB, 128 KB and 256 KB Flash	128 KB Flash	32 KB Flash
MCF51QU128VLH	MCF51QU64VLF	MCF51QU128VHS MCF51QU64VHS MCF51QU32VHS	MCF51QU128VHX	MCF51QU32VFM
MCF51QM128VLH	MCF51QM64VLF	MCF51QM128VHS MCF51QM64VHS MCF51QM32VHS	MCF51QM128VHX	MCF51QM32VFM
MCF51JU128VLH	MCF51JU64VLF	MCF51JU128VHS MCF51JU64VHS MCF51JU32VHS	MCF51JU128VHX	MCF51JU32VFM
MCF51JF128VLH	MCF51JF64VLF	MCF51JF128VHS MCF51JF64VHS MCF51JF32VHS	MCF51JF128VHX	MCF51JF32VFM
		MCF51JG256CHS		

For more information, visit freescale.com/ColdFire+