



ColdFire® Embedded Controllers

# MCF52110 Ultra-Low End Machine Vision

## Application Fact Sheet

### Overview

Machine vision systems are used in a wide variety of manufacturing and industrial control operations. Manufacturers are using machine vision solutions to get consistent quality improvement, more economical production, lower scrap rates and to do better inventory management, but they don't want a complex and expensive system. As a result, there is a major effort underway to create lower cost vision systems that are less complicated. This lowers the barriers to entry and brings machine vision to new systems that had previously found a machine vision solution too complex or expensive.

### Key Features

- V2 ColdFire® core
  - Up to 76 MIPS (Dhrystone 2.1) at 80MHz
- Connectivity options
  - Two I<sup>2</sup>C modules
  - Queued serial peripheral interface (QSPI)
  - Three universal asynchronous receiver/transmitters (UARTs)
- On-Chip Memory
  - Up to 128 KB of flash memory
  - 16 KB of internal SRAM
- Timers
  - Second watchdog timer with independent clock
  - Real Time Clock (RTC) with 32 kHz oscillator
- Package type
  - MAPBGA, LQFP and QFN packages

## Design Challenges

Machine vision is becoming more and more accessible. No longer do designers need a high cost microcontroller to create an entry-level machine vision system. Key requirements for a microprocessor in an entry-level machine vision system focus on performance and price. The processor must maintain a high performance level required for processing image analysis algorithms. The processor should be highly integrated with the necessary serial peripherals to enable communication with other subsystems. Some common subsystems are sensors, cameras and external serial memories for image processing. Machine vision systems also require the processor to have easy-to-program internal memory to maintain a simple and cost-effective design. Ideally, the processor would include an easy-to-program mechanism for handling complex machine vision algorithms. The ability for the processor to handle complex timing and image processing is critical to the overall system performance

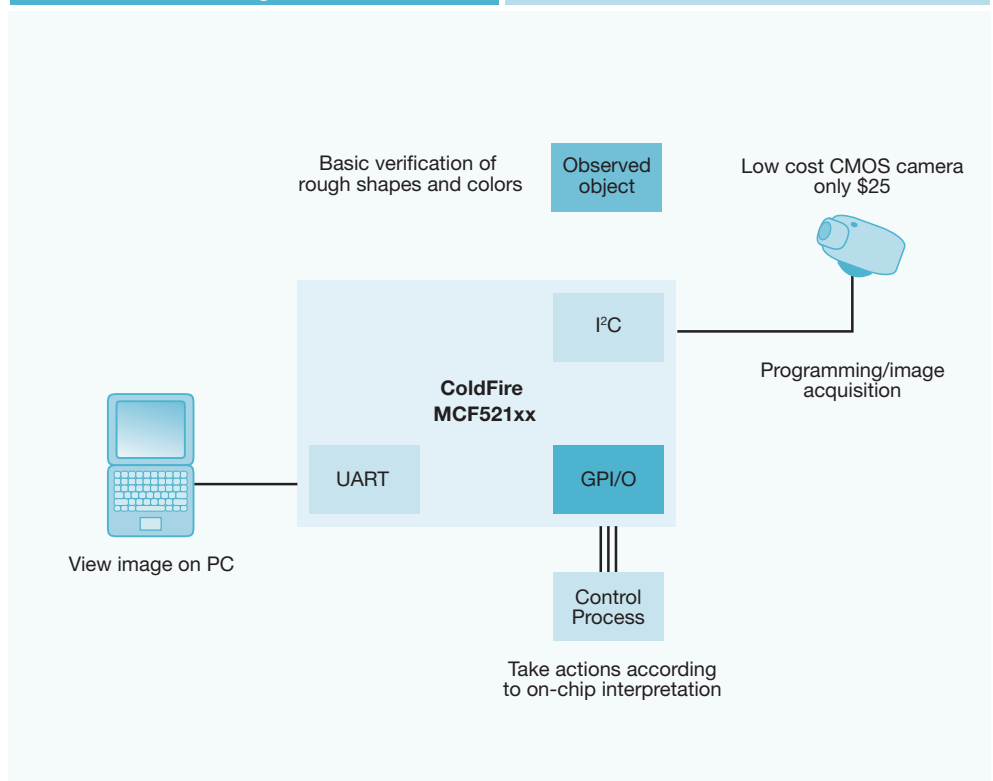
## Freescale Solution

The combination of several serial interfaces and a high performance level make the MCF521xx family of microcontrollers ideal for the low-end machine vision applications. The MCF521xx products are highly-integrated 32-bit microcontrollers based on the Version 2 ColdFire microarchitecture. Featuring 16 Kbytes of internal SRAM and up to 128 Kbytes of flash memory, four 32-bit timers with DMA request capability, a 4-channel DMA controller, two I<sup>2</sup>C modules, up to three UARTs

and a queued SPI, the MCF521xx family has been designed for general-purpose industrial control applications.

The ColdFire MCF521xx microcontrollers are ideal for power conscious customers who want the performance and flexibility of a 32-bit microcontroller plus a rich set of on-chip peripherals at a low cost. These small, highly integrated microcontrollers open the door to expanding application capabilities while driving down the total system cost.

MCF52110 Block Diagram



**Learn More:** For more information about ColdFire family products and applications, please visit [www.freescale.com/coldfire](http://www.freescale.com/coldfire).