

# ColdFire® MCF5251

## Audio connectivity evolution of the 32-bit processor

### Overview

The Freescale ColdFire® MCF5251 audio processor is a third-generation, 32-bit integrated microprocessor. The ColdFire MCF5251 processor introduces new audio connectivity features to the popular ColdFire SCF5249 and SCF5250 processors. The new features include USB 2.0 On-The-Go (OTG) technology with integrated high-speed physical layer (PHY), real-time clock (RTC), dedicated advanced technology attachment (ATA) hard disk interface supporting ATA-66 and two controller area network (CAN) modules for automotive control bus support in a single solution. The new integrated features empower customers to reduce the number of system components, lower their development costs and accelerate their time to market.

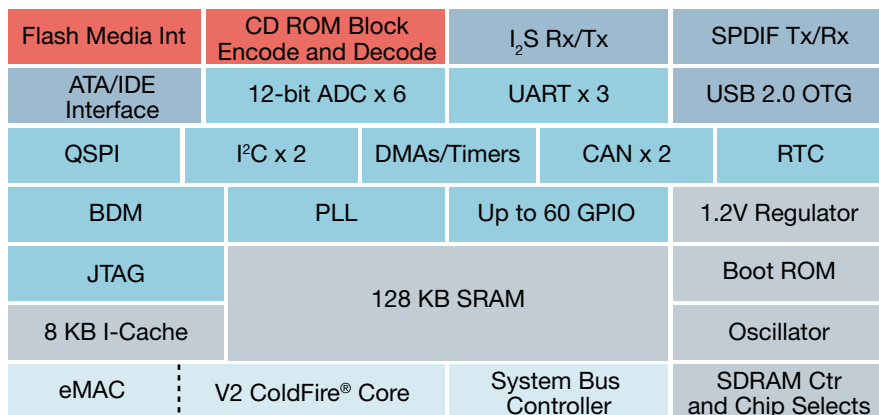
The ColdFire MCF5251 audio processor is the foundation for Freescale's ColdFire audio connectivity platform. It is integrated with Freescale's TRIO multimedia reference software that enables compressed audio playback, field software upgradeability, mobile device connectivity and Bluetooth® hands-free connectivity and streaming. The TRIO multimedia reference software is licensed to selected customers.\*

\*Subject to license agreement and registration

### Applications

- Automotive infotainment systems: radio head units and entertainment systems
- Consumer products: MP3/iPod docking stations, audio boom boxes and mini-systems and MP3 players

### ColdFire® MCF5251 Block Diagram



■ Debugging/Interface ■ Peripherals ■ Flash/ROM ■ RAM ■ Core Plus Feature

### 8K/ColdFire V2 Core

- Up to 125 Dhrystone 2.1 MIPS @ 140 MHz
- Enhanced multiply and accumulate (eMAC) module and HW divide

### Interfaces

- USB 2.0 High Speed On-the-Go (HS OTG) controller with integrated PHY
- Dedicated ATA hard disk interface
- Two controller area network (CAN) 2.0B modules
- Dedicated USB and ATA 16k SRAM with DMA support
- SmartMedia interface (including IDE and compact flash)
- Flash media card interface
- I<sup>2</sup>S interface (Rx x2/Tx x3)
- Three UARTs with flow control
- Queued serial peripheral interface (QSPI) (master only)
- Two I<sup>2</sup>C controllers

### Memory

- 8 KB cache
- 128 KB SRAM
- SDRAM controller

### Integration

- Real-time clock module
- Digital audio transmitter (S/PDIF) and two receivers compliant with IEC958 audio protocol
- Two-channel, 16-bit capture/compare/PWM timers
- Four-channel DMA controller
- Six-channel, 12-bit A/D converter
- 16-bit non-multiplexed data bus with four chip selects

### Product Specification

- -40°C to +85°C operating temperature
- Package: 225 MAPBGA

## Benefits

- An Enhanced Multiply and Accumulate (eMAC) module provides optimum performance and code density for the combination of control code and signal processing that is required for compressed audio decode, file management and system control
- Low power features, including flexible Phase-Lock Loop (PLL) with power-down mode and dynamic clock switching.
- Integrated peripherals and the eMAC module replace a required microcontroller unit (MCU) and digital signal processor (DSP) in selected applications
- On-chip integration of USB 2.0 OTG with integrated PHY, a tamper-proof real-time clock (RTC) and a high-speed UDMA ATA interface that reduces chip count, BOM costs and form factor sizes
- Two Controller Area Network (CAN) modules that enable networking interfaces for automotive applications
- Freescale's TRIO multimedia reference software that enables popular audio connectivity features, such as compressed audio playback (WMA, MP3, AAC, etc.), PMP connectivity, and Bluetooth hands-free connectivity and streaming

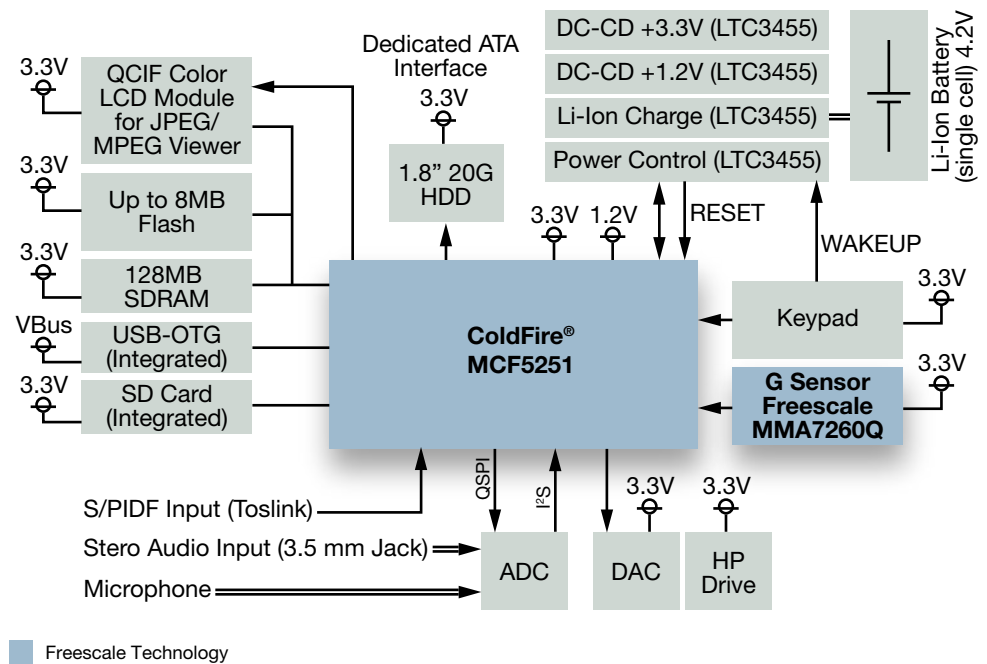
Freescale provides schematics, layout files and component lists for a 1.8-inch, 20 GB HDD reference design that includes a color liquid crystal display (LCD) and support for JPEG and MPEG-4 and USB 2.0 OTG. This is provided to selected customers upon request at no additional charge.\*

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## Freescale ColdFire® Processors for Automotive and Consumer Markets

Part Number	SRAM	Key Features	Package	Max Frequency	Availability
MCF5251	128 KB	USB 2.0 OTG, Dedicated ATA, Two CAN 2.0B Modules, RTC, S/PDIF, Flash Media and SmartMedia Interface/CD-ROM Block Encode and Decode, Auto-Qualified	225 MAPBGA	140 MHz	Now
SCF5250	128 KB	On-Chip Oscillator, 1.2V Linear Regulator and A/D Comparators, Includes Boot ROM Support, Auto-Qualified	144-LQFP, 196-MAPBGA	120 MHz	Now
SCF5249	96 KB	DMA Controller, eMAC, Flash Media Interface, I <sub>2</sub> S, S/PDIF, IDE, Interrupt Controller, PLL	144-LQFP, 160-MAPBGA	120 MHz (LQFP) 140 MHz (MAPBGA)	Now

## ColdFire® MCF5251 HDD Reference Design



**Learn More:** For more information about Freescale ColdFire audio products, please visit [www.freescale.com/digitalaudio](http://www.freescale.com/digitalaudio).