



FF1 - MCF5x07 implementation

This course covers MCF5307 and MCF5407 ColdFire MCUs

Objectives

- The course describes the ColdFire assembly language and highlights differences from 68K instructions.
- An example of SDRAM controller initialization is provided.
- Interfacing with external devices is explained.
- The interrupt controller is viewed in detail.
- Interrupt driven DMA transfers are studied.
- A programming example has been developed for each internal peripheral (serial; I2C, timer).
- This course has been delivered several times to companies developing industrial and avionics systems.

A lot of programming examples have been developed by ACSYS to explain the boot sequence and the operation of peripherals.

- They have been developed with Diab Data compiler and are executed under Lauterbach debugger.

A more detailed course description is available on request at formation@ac6-formation.com

Prerequisites

- Experience of a 32 bit processor or DSP is mandatory.

Course Environment

- Theoretical course
 - PDF course material (in English) supplemented by a printed version for face-to-face courses.
 - Online courses are dispensed using the Teams video-conferencing system.
 - The trainer answers trainees' questions during the training and provide technical and pedagogical assistance.
- At the start of each session the trainer will interact with the trainees to ensure the course fits their expectations and correct if needed

Target Audience

- Any embedded systems engineer or technician with the above prerequisites.

Course Outline

MCF5307 ARCHITECTURE

Overview

- Coldfire roadmap
- Differences between ColdFires and 68K processors
- 5307 block diagram
- Pinout
- Memory mapped I/O organization

V3 CORE

CORE ARCHITECTURE

- 5307 pipeline
- Programming model
- Addressing modes
- Instruction set
- Stack management, subroutine call and return
- C to assembly interface
- Exception management
- Internal SRAM
- 5307 cache operation

CORE DEBUG

- Intrusive vs non-intrusive debug
- BDM port
- Hardware breakpoints
- Trace port

PLATFORM

HARDWARE IMPLEMENTATION

- Dynamic bus sizing
- Address decoding
- Arbitration
- Burst cycles
- Bus error management

THE SIM MODULE

- The interrupt controller
- The software watchdog
- Reset, self-configuration
- Clock synthesis
- General Purpose I/O pins

THE MEMORY CONTROLLER AND THE DRAM/SDRAM CONTROLLER

- SRAM connection, chip-select programming
- DRAM / SDRAM basics
- The 5x07 (S)DRAM controller : address decoding, refresh rate definition, address multiplexing selection

INTEGRATED I/Os

THE SERIAL PORTS

- Asynchronous ports
- Transmit and receive sequences
- Synchronous port : I2C basics
- Transmit and receive sequences

THE DMA CONTROLLER

- Single address vs dual address transfers
- Hardware interface, hardware initiated transfers
- Programming model

THE TIMERS

- Capture mode
- Period selection
- Interrupt control

MCF5407 ENHANCEMENTS

MCF5407

- V4 core enhancements
- Instruction set additions
- Enhanced memories
- On-chip DMA and serial ports modifications