



FD2 - DSP563XX implementation

This course covers the 563XX 24-bit DSP NXP family

Objectives

- The course explains how to design a 56L307 based board
- Optimized coding examples are described
- A generic interrupt handler is introduced
- DMA channels are viewed in detail
- The course focuses on the serial ports SCI and ESSI
- Practical exercises are executed on a 56L307 board

A lot of programming examples have been developed by ACSYS to explain how to write optimized code.

- They have been developed with CodeWarrior compiler and are executed under CodeWarrior debugger.

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

Prerequisites

- Basic knowledge of signal processing.

Environnement du cours

- Cours théorique
 - Support de cours au format PDF (en anglais) et une version imprimée lors des sessions en présentiel
 - Cours dispensé via le système de visioconférence Teams (si à distance)
 - Le formateur répond aux questions des stagiaires en direct pendant la formation et fournit une assistance technique et pédagogique
- Au début de chaque demi-journée une période est réservée à une interaction avec les stagiaires pour s'assurer que le cours répond à leurs attentes et l'adapter si nécessaire

Audience visée

- Tout ingénieur ou technicien en systèmes embarqués possédant les prérequis ci-dessus.

Plan du cours

INTRODUCTION TO DIGITAL SIGNAL PROCESSING

- Arithmetic processing of real-time signals
- Modified dual Harvard architecture : the X-memory and the Y-memory
- MAC operation
- DSP 563XX family introduction

563XX ARCHITECTURE

- Core buses
- Processing states
- Reset
- 56L307 mapping

THE DSP CORE

- The Data ALU
- The Address Generation Unit
- The Program Control Unit
- The instruction set
- C-to-assembly interface
- The PLL
- The 563XX instruction cache
- Exception management
- The debugging support
- JTAG use to access the OnCE

HARDWARE IMPLEMENTATION

- External memory addressing
- Arbitration protocol
- SRAM interface
- DRAM basics
- DRAM interface

THE DMA CONTROLLER

- Overlap between DMA channel and core
- Channel priority
- Triggering modes
- Circular buffer management

THE HOST INTERFACE

- Host interface description
- Transfer modes
- Handshaking protocols
- DMA access to HTX and HRX data registers
- Boot up using the HIO8 host port
- Programming model : host-side and DSP-side register banks

THE TRIPLE TIMER MODULE

- Timer related pins
- Triple timer modes
- Event capture
- Signal width / period measuring
- PWM
- Watchdog modes

THE ENHANCED SYNCHRONOUS SERIAL INTERFACE

- ESSI signals
- Network mode
- On-Demand mode
- ESSI exceptions
- Transmit and receive sequences

THE SERIAL COMMUNICATION INTERFACE

- SCI block diagram

- Asynchronous vs synchronous operation modes
- Baud rate selection
- Bootstrap loading from the SCI
- Asynchronous transmit and receive sequences

THE ENHANCED FILTER COPROCESSOR

- PMB interface, FMAC unit, FDM bank, FCM bank
- FIR filter options
- IIR filter options
- Multichannel mode
- Input scaling