Signal Controllers

56F8335

Target Applications

- > Automotive control
- > Industrial control/connectivity
- > Advanced motion control
- > Home appliances
- > General-purpose inverters
- > Smart relays
- > Fire and security systems
- > Power management
- > Medical monitoring
- > Multiphase inverters

Overview

Freescale Semiconductor's digital signal controllers (DSC) combine the ease-of-programming provided by a microcontroller (MCU) with the signal processing power and efficiency of a digital signal processor (DSP). The microprocessor-style programming model and optimized instruction set allow straightforward generation of efficient, compact code for both DSP and MCU applications. The 56F8100 and 56F8300 series are based on the 56800E digital signal controller core that utilizes a Harvard architecture consisting of three execution units operating in parallel, allowing as many as six operations per instruction cycle. From the broad portfolio of software and pin-compatible components with various combinations of peripheral modules, memory densities and clock speeds, system designers will find an ideal component to create their product.

The 56F8300 series executes code from its third-generation flash at up to 60 MIPS (millions of instructions per second) in demanding industrial and automotive environments. The 56F8300 series includes controller-level safety-focused functions that help reduce overall device count and system costs. These include an integrated temperature sensor for component temperature monitoring, multiple fault conditions for system flexibility without compromising system safety, built-in write protection registers for critical functionality, and on-chip clock synthesis that allows graceful shutdown to prevent system damage. An integrated FlexCAN module offering full CAN (controller area network) capability handles all networking communication for improved networking performance and reliability. For applications that do not need CAN connectivity, need fewer peripherals or need less performance, Freescale also offers the pin-compatible 56F8100 series.

56800E Core Features	Benefits
> Up to 60 MIPS at 60 MHz execution frequency	> Proven to deliver more control functionality with a smaller memory footprint than competing architectures
> DSP and MCU functionality in a unified, C-efficient architecture	> Hybrid architecture facilitates implementation of both control and signal processing functions in a single device
> JTAG/enhanced on-chip emulation (EOnCE™) for unobtrusive, real-time debugging	> High-performance, secured Flash memory helps eliminate the need for external storage devices
> Four 36-bit accumulators	> Extended temperature range allows for operation of nonvolatile memory in harsh environments
> 16- and 32-bit bidirectional barrel shifter	> Flash memory emulation of EEPROM helps eliminate the need for external nonvolatile memory
> Parallel instruction set with unique addressing modes	> 32-bit performance with 16-bit code density
> Hardware DO and REP loops available	> On-chip voltage regulator and power management help reduce overall system cost
> Three internal address buses	> Diversity of peripheral configuration facilitates the elimination of external components, improving system integration and reliability
> Four internal data buses	> This device boots directly from Flash, providing additional application flexibility
> Architectural support for 8-, 16- and 32-bit single-cycle data fetches	> High-performance pulse-width modulation (PWM) with programmable fault capability helps to simplify design and to promote compliance with safety regulations
> MCU-style software stack support	> PWM and analog-to-digital converter (ADC) modules are tightly coupled to help reduce processing overhead
> Controller-style addressing modes and instructions	> Low-voltage interrupts (LVIs) help protect the system from brownout or power failure
> Single-cycle 16 x 16-bit parallel multiplier-accumulator (MAC)	> Simple in-application Flash memory programming via EOnCE or serial communication

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56F8335 Memory Features

> Architecture permits as many as three simultaneous accesses to program and data memory

> On-chip memory includes high-speed volatile and nonvolatile components:

- 80 KB On-chip Flash
  - 64 KB of Program Flash
  - 8 KB of Data Flash
  - 8 KB of Boot Flash
- 4 KB of Program RAM
- 8 KB of Data RAM

> Memories operate at 60 MHz (zero wait states) over temperature range (-40°C to +125°C) with no software tricks or hardware accelerators required

> Flash security feature helps prevent unauthorized access to its content

56F8335 Peripheral Circuit Features

> Two PWM modules with 12 outputs and eight programmable fault inputs

> Two serial peripheral interfaces (SPIs)

> Two serial communications interfaces (SCIs)

> I²C communications master mode (emulated)

> Sixteen 16-bit timers with input and output compare capability

> Two four-input quadrature decoders

> FlexCAN module, 2.0 A/B compatible

> Temperature sensing diode to monitor the on-chip temperature

> On-chip 3.3V to 2.6V voltage regulator

> Software-programmable Phase-Lock Loop (PLL)

> On-chip relaxation oscillator

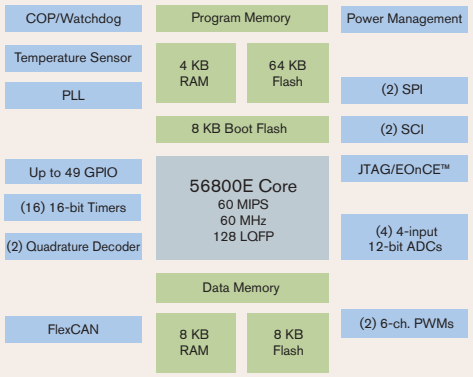
> 12-bit ADCs with 16 inputs, self-calibration and current injection capability

> Up to 49 general purpose input/output (GPIO) pins

> External reset input pin for hardware reset

> Computer operating properly (COP)

> Integrated power-on reset and LVI module



Product Documentation

56F8300 Peripheral User Manual	Detailed peripheral descriptions of the 56F8300 family of devices ***Order Number:*** MC56F8300UM
56F8335/56F8135 Technical Data Sheet	Electrical and timing specifications, pin descriptions and package descriptions ***Order Number:*** MC56F8335
56F8335 Product Brief	Summary description and block diagram of the 56F8335 core, memory, peripherals and interfaces ***Order Number:*** MC56F8335PB
DSP56800E Reference Manual	Detailed description of the DSP56800E architecture, 16-bit core processor and the instruction set ***Order Number:*** DSP56800ERM

Award-Winning Development Environment

> Processor Expert™ (PE) technology provides a rapid application design (RAD) tool that combines easy-to-use, component-based software application creation with an expert knowledge system.

> The CodeWarrior™ Integrated Development Environment (IDE) is a sophisticated tool for code navigation, compiling and debugging. A comprehensive set of evaluation modules (EVMs) and development system cards will support concurrent engineering. Together, PE technology, the CodeWarrior tool suite and EVMs create a comprehensive, scalable tools solution for easy, fast and efficient development.

Ordering Information

Part	MC56F8335
Package Type	Low-Profile Quad Flat Pack (LQFP)
Pin Count	128
Temperature Range	-40°C to +105°C
Order Number	MC56F8335VFG60

Part	MC56F8335
Package Type	Low-Profile Quad Flat Pack (LQFP)
Pin Count	128
Temperature Range	-40°C to +125°C
Order Number	MC56F8335MFG60

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