NXP

Signal Controllers

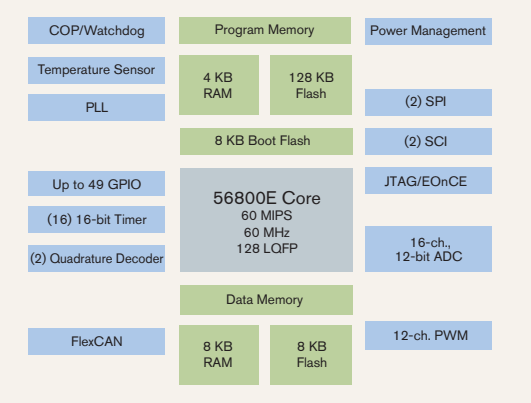# 56F8345

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

Designers of the 56F8345 subscribe to the philosophy that you can never have enough of a good thing. That's why they've added more on-chip Flash memory (up to 144 KB), pulse-width modulation (PWM) outputs, analog-to-digital converter (ADC) inputs, timer channels and quadrature decoders to the peripherals found in smaller members of the device family. With these additions, an entirely different set of applications can now benefit from the hybrid microcontroller (MCU)/DSP capabilities of the 56800E architecture. Imagine adding signal processing capabilities to a smart user interface or adding sophisticated communication protocol to an industrial control application. The possibilities are endless, especially when you consider that you can have access to these advanced features at extreme temperatures.

COP/Watchdog	Program Memory	Power Management
Temperature Sensor	4 KB RAM / 128 KB Flash	
PLL		(2) SPI
	8 KB Boot Flash	(2) SCI
Up to 49 GPIO	56800E Core 60 MIPS 60 MHz 128 LQFP	JTAG/EOnCE
(16) 16-bit Timer		16-ch., 12-bit ADC
(2) Quadrature Decoder		
	Data Memory	
FlexCAN	8 KB RAM / 8 KB Flash	12-ch. PWM

56800E Core Features

> Up to 60 MIPS at 60 MHz execution frequency
> DSP and microcontroller (MCU) functionality in a unified, C-efficient architecture
> JTAG/enhanced on-chip emulation (EOnCE™) for unobtrusive, real-time debugging
> Four 36-bit accumulators
> 16- and 32-bit bidirectional barrel shifter
> Parallel instruction set with unique addressing modes
> Hardware DO and REP loops available
> Three internal address buses
> Four internal data buses
> Architectural support for 8-, 16- and 32-bit single-cycle data fetches
> MCU-style software stack support
> Controller-style addressing modes and instructions
> Single-cycle 16 x 16-bit parallel multiplier-accumulator (MAC)
> Proven to deliver more control functionality with a smaller memory footprint than competing architectures

Benefits

> Hybrid architecture facilitates implementation of both control and signal processing functions in a single device
> High-performance, secured Flash memory helps eliminate the need for external storage devices
> Extended temperature range allows for operation of nonvolatile memory in harsh environments
> Flash memory emulation of EEPROM helps eliminate the need for external nonvolatile memory
> 32-bit performance with 16-bit code density
> On-chip voltage regulator and power management help reduce overall system cost
> Diversity of peripheral configuration facilitates the elimination of external components, improving system integration and reliability
> This device boots directly from Flash, providing additional application flexibility
> High-performance PWM with programmable fault capability helps to simplify design and to promote compliance with safety regulations
> PWM and ADC modules are tightly coupled to help reduce processing overhead
> Low-voltage interrupts (LVIs) help protect the system from brownout or power failure
> Simple in-application Flash memory programming via EOnCE or serial communication

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56F8345 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:

  ▪ 144 KB On-chip Flash

    › 128 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 accesses to its content

56F8345 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 sense 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
56F8345/56F8145 Technical Data Sheet	Electrical and timing specifications, pin descriptions and package descriptions **Order Number:** MC56F8345
56F8345 Product Brief	Summary description and block diagram of the 56F8345 core, memory, peripherals and interfaces **Order Number:** MC56F8345PB
DSP56800E Reference Manual	Detailed description of the DSP56800E architecture, 16-bit core processor and the instruction set **Order Number:** DSP56800ERM

Ordering Information

Part	MC56F8345
Package Type	Low-Profile Quad Flat Pack (LQFP)
Pin Count	128
Temperature Range	-40°C to +105°C
Order Number	MC56F8345VFG60

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Package Type	Low-Profile Quad Flat Pack (LQFP)
Pin Count	128
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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.

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