

# 56F8356

### Target Applications

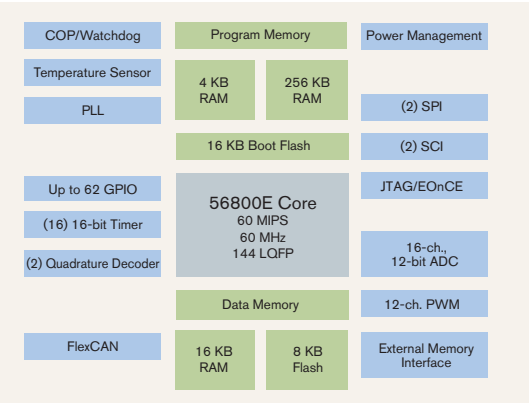
- > Automotive control
- > Industrial control/connectivity
- > Advanced motion control
- > Home appliances
- > General-purpose inverters
- > Smart relays
- > Fire and security systems
- > Power management
- > Medical monitoring
- > Multiphase inverters

### Overview

You no longer need to compromise or make tradeoffs when selecting an embedded processor platform for your embedded designs. The 56F8356 offers you the same memory as the 56F8355, but includes an external memory interface, should you wish to add even more memory to your system.

Furthermore, the 56F8356 comes in the same package and package pin-out as the 56F8346, so you can migrate your 56F8346 design to the 56F8356 with minimal effort. How's that for a migration strategy?

Moving to this 144-pin LQFP package allows you to take advantage of the included external memory interface and additional on-chip memory to satisfy the growing functional needs of your design.



### 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
- > Off-chip memory expansion capabilities allow for glueless interfacing with the additional memory of external devices without sacrificing performance
- > This device boots directly from Flash, providing additional application flexibility
- > High-performance pulse-width modulation (PWM) with programmable fault capability helps to simplify design and promotes compliance with safety regulations
- > PWM and analog-to-digital converter (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

### 56F8356 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:
  - 280 KB On-chip Flash
    - › 256 KB of Program Flash
    - › 8 KB of Data Flash
    - › 16 KB of Boot Flash
  - 4 KB of Program RAM
  - 16 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 prevents unauthorized accesses to its content
- > Off-chip memory expansion capabilities provide a simple method for interfacing additional external memory and/or peripheral devices
  - Access up to 1 MB of external program memory or 1 MB of external data memory
  - External accesses supported at up to 60 MHz (zero wait states)

### 56F8356 Peripheral Circuit Features

- > Two PWM modules with 12 outputs and seven programmable fault inputs
- > Two serial peripheral interfaces (SPIs)
- > Two serial communications interfaces (SCIs)
- > I<sup>2</sup>C 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 62 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

<b>56F8300 Peripheral User Manual</b>	Detailed peripheral descriptions of the 56F8300 family of devices <b>Order Number:</b> MC56F8300UM
<b>56F8356/56F8156 Technical Data Sheet</b>	Electrical and timing specifications, pin descriptions and package descriptions <b>Order Number:</b> MC56F8356
<b>56F8356 Product Brief</b>	Summary description and block diagram of the 56F8356 core, memory, peripherals and interfaces <b>Order Number:</b> MC56F8356PB
<b>DSP56800E Reference Manual</b>	Detailed description of the DSP56800E architecture, 16-bit core processor and the instruction set <b>Order Number:</b> 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.

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

### Ordering Information

<b>Part</b>	MC56F8356
<b>Package Type</b>	Low-Profile Quad Flat Pack (LQFP)
<b>Pin Count</b>	144
<b>Temperature Range</b>	-40°C to +105°C
<b>Order Number</b>	MC56F8356V60
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<b>Package Type</b>	Low-Profile Quad Flat Pack (LQFP)
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