

# 56F8135

### Target Applications

- > Polyphase metering
- > Universal Power Supply (UPS)
- > Electric vehicles
- > Currency validation
- > Industrial control
- > Home appliances
- > Smart relays
- > Fire and security systems
- > Medical monitoring

### Overview

Freescale Semiconductor's digital signal controllers (DSC) combine the ease-of-programming provided by a microcontroller unit (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 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 56F8100 series was developed for price-sensitive industrial and consumer applications. Devices in the series are ideal for applications requiring intensive computation (for example, advanced motor control while handling incoming data). Industrial scenarios include digital power conversion, three-phase motor control, power monitoring and building control. Consumer applications include electric lawn equipment or exercise equipment such as a treadmill.

The 56F8100 series includes 40 MIPS processing power, on-chip flash memory and a full assortment of analog and digital peripherals. For applications that require more performance, features, controller area network (CAN) connectivity or an extended temperature range, Freescale also offers the pin-compatible 56F8300 series.

### 56800E Core Features

- > Up to 40 MIPS at a guaranteed 40 MHz core frequency
- > DSP and 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 eliminates the need for external storage devices
- > Extended temperature range up to +105°C allows for operation of nonvolatile memory in industrial applications
- > Flash memory emulation of EEPROM eliminates the need for external nonvolatile memory
- > 32-bit performance with 16-bit code density
- > On-chip voltage regulator and power management 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 pulse-width modulation (PWM) with programmable fault capability simplifies design and promotes compliance with safety regulations
- > PWM and analog-to-digital (ADC) modules are tightly coupled to reduce processing overhead
- > Low-voltage interrupts (LVIs) protect the system from brownout or power failure
- > Simple in-application Flash memory programming via EOnCE or serial communication

### Memory Features

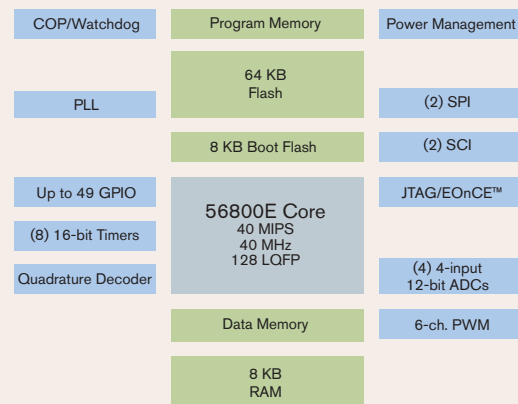
- > Architecture permits as many as three simultaneous accesses to program and data memory
- > On-chip memory includes high-speed volatile and nonvolatile components
  - 64 KB of Program Flash
  - 8 KB of Data RAM
  - 8 KB of Boot Flash
- > All memories operate at 40 MHz (zero wait states) over temperature range (-40°C to +105°C) with no software tricks or hardware accelerators required
- > Flash security feature prevents unauthorized access to its content

### 56F8135 Peripheral Circuit Features

- > PWM module with six outputs and four programmable fault inputs
- > Two serial peripheral interfaces (SPIs)
- > Two serial communications interfaces (SCIs)
- > Eight 16-bit timers with input and output compare capability
- > On-chip 3.3V to 2.6V voltage regulator
- > Software-programmable Phase-Lock Loop (PLL)
- > 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
- > I<sup>2</sup>C communications master mode (emulated)
- > One four-input quadrature decoder
- > On-chip relaxation oscillator

### 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 complete set of evaluation modules (EVMs) and development system cards will support concurrent engineering. Together, PE technology, CodeWarrior tools and EVMs create a complete, scalable tools solution for easy, fast and efficient development.



### Product Documentation

<b>56F8300 Peripherals Manual</b>	Detailed peripheral description of the 56F8300 family of devices <b>Order Number:</b> MC56F8300UM
<b>56F8335/ 56F8135 Technical Data Sheet</b>	Electrical and timing specifications, device-specific peripheral information and package and pin descriptions <b>Order Number:</b> MC56F8335
<b>56F8135 Product Brief</b>	Summary description and block diagram of the core, memory, peripherals and interfaces <b>Order Number:</b> MC56F8135PB
<b>DSP56800E Reference Manual</b>	Detailed description of the DSP56800E architecture, 16-bit core processor and the instruction set <b>Order Number:</b> DSP56800ERM

### Ordering Information

Part	MC56F8135
Package Type	Low-Profile Quad Flat Pack (LQFP)
Pin Count	128
Order Number	MC56F8135VFG
Temperature Range	-40°C to +105°C

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