

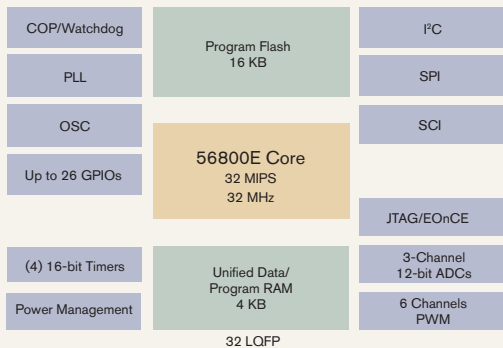
56F8013

Target Applications

- > Industrial motor control
- > Appliance motor control
- > Dimming lamp ballasts
- > Switched-mode power supply
- > Soft-switching PFC
- > DC-DC power supplies

Freescale Semiconductor's 56F8013 combines, on a single chip, the processing power of a digital signal processor (DSP) and the functionality of a microcontroller. With a flexible set of peripherals, the 56F8013 provides a cost-effective, high performance 16-bit solution for motor control applications that require a greater number of pulse-width modulators (PWMs).

Because of its configuration flexibility and compact program code, the cost-effective 56F8013 is well suited for many applications. The 56F8013 is a member of the 56800E core-based family of digital signal controllers which utilizes a Harvard architecture consisting of three execution units operating in parallel, allowing as many as six operations per instruction cycle. The microprocessor-style programming model and optimized instruction set allow straightforward generation of efficient, compact code for both DSP and MCU applications.



56800E Core Features

- > Up to 32 MIPS at a guaranteed 32 MHz execution 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
- > MCU-style software stack support
- > Controller-style addressing modes and instructions
- > Single-cycle 16 x 16-bit parallel multiplier-accumulator (MAC)

Benefits

- > Hybrid architecture facilitates implementation of both control and signal processing functions in a single device
- > Proven to deliver more control functionality with a smaller memory footprint than competing architectures
- > High performance with 16-bit code density
- > On-chip voltage regulator and power management reduce overall system cost
- > Flexible power saving modes
- > System-on-a-chip integration of flexible peripherals eliminates external components, improves system reliability and minimizes system cost
- > High-performance PWM with programmable fault capability simplifies design and promotes compliance with safety regulations
- > PWM, ADC and quad timers 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 Enhanced OnCE™ or serial communication
- > PWM and timers can be clocked at up to 96 MHz

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
 - 16 KB of Program Flash
 - 4 KB of unified data/program RAM
- > Extended temperature range allows for operation of nonvolatile memory in harsh environments
- > All memories operate at 32 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 accesses to its content
- > Flash protection prevents accidental modifications
- > Flash memory emulation of EEPROM eliminates the need for external nonvolatile memory

56F8013 Peripheral Circuit Features

- > High-speed pulse-width modulator (PWM) that can be clocked at up to 96 MHz
- > Serial peripheral interface (SPI)
- > Serial communication interface (SCI) with LIN slave functionality
- > Four 16-bit timers that can be clocked at up to 96 MHz
- > Software-programmable Phase-Lock Loop (PLL)
- > Two 12-bit high-performance analog-to-digital converters (ADCs) with six inputs at rates up to 1.1 µs per sequential or simultaneous conversion
- > Up to 26 general purpose input output (GPIO) pins
- > Computer operating properly (COP)
- > Integrated power-on reset and low-voltage interrupt module
- > I²C communication module supporting slave, master and multimaster mode
- > On-chip 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, CodeWarrior tools and EVMs create a complete, scalable tools solution for easy, fast and efficient development.

Product Documentation

56F8000 Peripheral Reference Manual	Detailed peripheral description of the 56F8000 family of devices Order Number: MC56F8000RM
56F8013 Technical Data Sheet	Electrical and timing specifications, device-specific peripheral information and package and pin descriptions Order Number: MC56F8013
56F8013 Product Brief	Summary description and block diagram of the core, memory, peripherals and interfaces Order number: MC56F8013PB
DSP56800E Reference Manual	Detailed description of the DSP56800E architecture, 16-bit core processor and the instruction set Order Number: DSP56800ERM

Ordering Information

Part	MC56F8013
Package	32 LQFP
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Order Number	MC56F8013VFAE
Temperature Range	-40°C to +105°C

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