Freescale Semiconductor
56F8014 Product Brief

The 56F8014 is a member of the 56800E core-based family of Digital Signal Controllers (DSCs). It combines, on a single chip, the processing power of a DSP and the functionality of a microcontroller with a flexible set of peripherals to create a cost-effective solution for power supply controllers or non-motor applications requiring more ADCs, such as instrumentation.

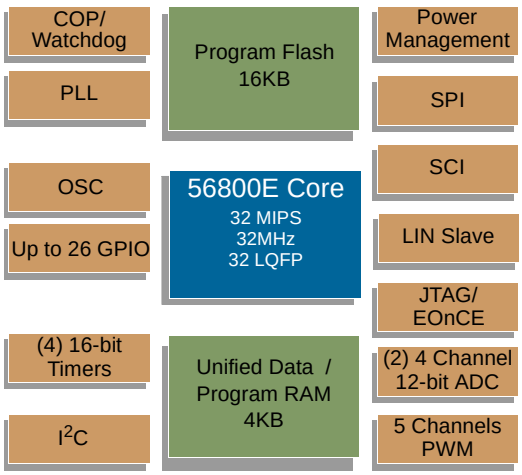
Because of its low cost, configuration flexibility, and compact program code, the 56F8014 is well suited for many applications. The 56800E core is based on a Harvard architecture consisting of three execution units operating in parallel, allowing as many as six operations per instruction cycle. The microprocessor-style programming model and optimized instruction set allow straightforward generation of efficient, compact code for both DSP and MCU applications.

BENEFITS

- Hybrid architecture facilitates implementation of both control and signal processing functions in a single device
- Extended temperature range allows for operation of non-volatile memory in harsh environments
- Flash memory emulation of EEPROM eliminates the need for external non-volatile memory
- High performance with 16-bit code density
- On-chip voltage regulator and power management reduces 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 coupled to reduce processing overhead
- Low-voltage interrupts 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 96MHz, enabling advanced digital power conversion
- High-performance 12-bit ADC

56800E CORE FEATURES

- Up to 32 MIPS at 32MHz 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)
- Proven to deliver more control functionality with a smaller memory footprint than competing architectures



EXAMPLE APPLICATIONS

- Smart Sensors
- Instrumentation
- Dimming lamp ballast
- Switched-mode power supply
- Soft-switching PFC
- DC-DC power supplies

MEMORY FEATURES

- Architecture permits as many as three simultaneous accesses to program and data memory
- On-chip memory includes high-speed volatile and non-volatile components
  - 16KB of Program Flash
  - 4KB of Unified Data/Program RAM
- All memories operate at 32MHz (zero wait states) over temperature range (-40° 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

AWARD-WINNING DEVELOPMENT ENVIRONMENT

- Processor Expert™ (PE) 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 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 and EVMs create a complete, scalable tools solution for easy, fast, and efficient development.

56F8014 PERIPHERAL CIRCUIT FEATURES

- High-speed Pulse Width Modulator (PWM) that can be clocked at up to 96MHz
- Serial Peripheral Interface (SPI)
- Serial Communication Interface (SCI) with LIN Slave
- Four 16-bit Timers that can be clocked at up to 96MHz
- Software-programmable Phase Lock Loop (PLL)
- Two 12-bit Analog-to-Digital Converters (ADC) with eight inputs at rates up to 1.1µs per sequential or simultaneous conversion
- Up to 26 General Purpose I/O (GPIO) pins
- Computer Operating Properly (COP)
- Integrated Power-On Reset and Low-Voltage Interrupt module
- I^2C Communication Module supporting Slave, Master and MultiMaster Mode
- On-Chip Relaxation Oscillator

ORDERING INFORMATION

PART	***MC56F8014***
PACKAGE	***32 LQFP***
ORDER NUMBER	***MC56F8014VFAE***
TEMPERATURE RANGE	***-40° to 105°C***

PRODUCT DOCUMENTATION

56F8000 Peripherals Reference Manual	Detailed peripheral description of the 56F8000 family of devices Order Number: MC56F8000RM
56F8014 Technical Data Sheet	Electrical and timing specifications, device-specific peripheral information and package and pin descriptions Order Number: MC56F8014
56F8014 Product Brief	Summary description and block diagram of the core, memory, peripherals and interfaces Order number: MC56F8014PB
DSP56800E Reference Manual	Detailed description of the DSP56800E architecture, 16-bit core processor and the instruction set Order Number: DSP56800ERM

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MC56F8014PB