Freescale Semiconductor’s 56F8014 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 56F8014 provides a cost-effective, high performance 16-bit solution for power supply controllers or non-motor applications that require more analog-to-digital converters (ADCs).

Because of its configuration flexibility and compact program code, the cost-effective 56F8014 is well suited for many applications. The 56F8014 is a member of the 56800E core-based family of digital signal controllers. The 56800E core 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.

**Target Applications**
- Smart sensors
- Instrumentation
- Dimming lamp ballasts
- Switched-mode power supply
- Soft-switching PFC
- DC-DC power supplies

**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 (EOOnCE) 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 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
- High-performance 12-bit ADC

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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 non-volatile 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 non-volatile memory

5658014 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 eight 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

Product Documentation
56F8000 Peripheral Reference Manual
Order Number: MC56F8000RM

56F8014 Technical Data Sheet
Order Number: MC56F8014

56F8014 Product Brief
Order number: MC56F8014PB

DSP56800E Reference Manual
Order Number: DSP56800ERM

Ordering Information
Part MC56F8014
Package 32 LQFP
Order Number MC56F8014VFAE
Temperature Range -40°C to +105°C

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.

Learn More: For more information about Freescale products, please visit www.freescale.com.