

# Freescale Semiconductor

## 56F8366 Product Brief

If you find yourself needing a little more memory than what the 56F8365 has to offer, or simply need to interface to other devices in your system in a parallel fashion, then the 56F8366 is the device for you. Moving to this 144-pin LQFP package allows you to take advantage of its included external memory interface for these additional tasks.

You will still enjoy 576KB of on-chip Flash memory, PWM outputs, Analog-to-Digital Converter inputs, and timer channels, along with the capability of interfacing with other devices in your system. Whether you are adding performance to your control application, or control capabilities to your signal processing system, you can benefit from the flexibility and compatibility provided by the 56F8365 and 56F8366.

### BENEFITS

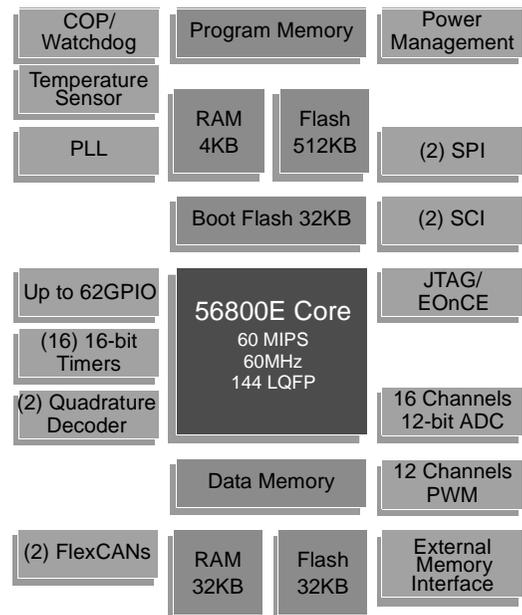
- Hybrid architecture facilitates implementation of both control and signal processing functions in a single device
- High-performance, secured Flash memory eliminates the need for external storage devices
- Extended temperature range allows for operation of non-volatile memory in harsh environments
- Flash memory emulation of EEPROM eliminates the need for external non-volatile memory
- 32-bit performance with 16-bit code density
- On-chip voltage regulator and power management reduces overall system cost
- Off-chip memory expansion capabilities allow for glue-less interfacing with the additional memory of external devices without sacrificing performance
- This device boots directly from Flash, providing additional application flexibility
- High-performance PWM with programmable fault capability simplifies design and promotes compliance with safety regulations
- PWM and ADC modules are tightly 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

### 56800E CORE FEATURES

- Up to 60 MIPS at 60MHz 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
- 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

### EXAMPLE APPLICATIONS

- Automotive control
- Industrial control/networking
- Advanced motion control
- Home appliances
- General purpose inverters
- Smart relays
- Fire and security systems
- Power management
- Medical monitoring
- Multi-phase inverters



## 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
  - 512KB of Program Flash
  - 4KB of Program RAM
  - 32KB of Data Flash
  - 32KB of Data RAM
  - 32KB of Boot Flash
- All memories operate at 60MHz (zero wait states) over temperature range (-40° 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 1MB of external program memory or 1MB of external data memory
  - External accesses supported at up to 60MHz (zero wait states)

## 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.

## 56F8366 PERIPHERAL CIRCUIT FEATURES

- Two Pulse Width Modulator (PWM) modules with 12 outputs and seven programmable fault inputs
- Two Serial Peripheral Interfaces (SPI)
- Two Serial Communication Interfaces (SCI)
- I<sup>2</sup>C communications master mode (emulated)
- Sixteen 16-bit Timers with input and output compare capability
- Two four-input Quadrature Decoders
- Two FlexCAN modules, 2.0 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 Analog-to-Digital Converters (ADC) with 16 inputs, self-calibration, and current injection capability
- Up to 62 General Purpose I/O (GPIO) pins
- External reset input pin for hardware reset
- Computer Operating Properly (COP)
- Integrated Power-On Reset and Low-Voltage Interrupt module

## ORDERING INFORMATION

<b>PART</b>	<b>MC56F8366</b>
<b>PACKAGE</b>	<b>144 LQFP</b>
<b>ORDER NUMBER</b>	<b>MC56F8366MFV60</b>
<b>TEMPERATURE RANGE</b>	<b>-40° to 125°C</b>
<b>ORDER NUMBER</b>	<b>MC56F8366VFV60</b>
<b>TEMPERATURE RANGE</b>	<b>-40° to 105°C</b>

## PRODUCT DOCUMENTATION

<b>56F8300 Peripherals Manual</b>	Detail peripheral description of the 56F8300 family of devices Order Number: MC56F8300UM
<b>56F8366 / 56F8166 Technical Data Sheet</b>	Electrical and timing specifications, device-specific peripheral information and package and pin descriptions Order Number: MC56F8366
<b>56F8366 Product Brief</b>	Summary description and block diagram of the core, memory, peripherals and interfaces Order number: MC56F8366PB
<b>DSP56800E Reference Manual</b>	Detailed description of the DSP56800E architecture, 16-bit core processor and the instruction set Order Number: DSP56800ERM