MC56F84xxx

The ultimate solution in performance and precision for energy-efficient innovation
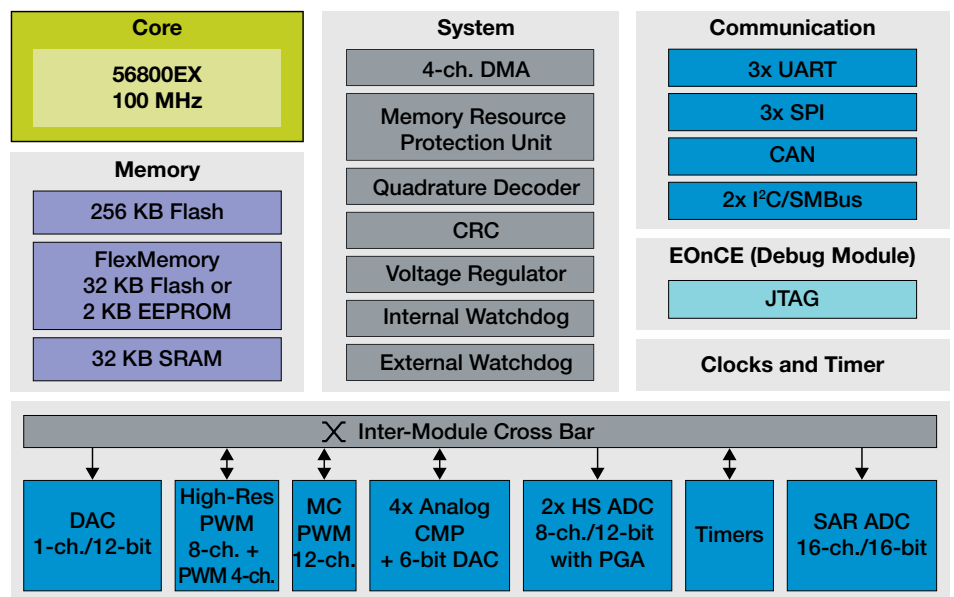
Target Applications

- Switched mode power supply
- Advanced motor control
- Dual motor control
- Smart appliances
- Uninterruptable power supply
- Photovoltaic systems
- Wireless charging
- Advanced lighting

Overview

The MC56F84xxx is the market's fastest DSP MCU, offering exceptional precision, sensing and control for the most efficient digital power conversion and advanced motor control applications. The MC56F84xxx includes advanced high-speed and high-accuracy peripherals such as high-resolution pulse-width modulation (PWM) with 312 picosecond resolution, dual high-speed 12-bit analog-to-digital controllers (ADCs) with built-in PGA sampling up to 3.3 mega samples per second (MSPS) and one high-precision 16-bit ADC. Faster application-specific control loops are driven via a high-speed 32-bit DSP core with single-cycle math computation, fractional arithmetic support and parallel moves.

MC56F84xxx

Core
56800EX 100 MHz

Memory
256 KB Flash
FlexMemory 32 KB Flash or 2 KB EEPROM
32 KB SRAM

System
4-ch. DMA
Memory Resource Protection Unit
Quadrature Decoder
CRC
Voltage Regulator
Internal Watchdog
External Watchdog

Communication
3x UART
3x SPI
CAN
2x I²C/SMBus

EOnCE (Debug Module)
JTAG

Clocks and Timer

Inter-Module Cross Bar

DAC 1-ch./12-bit	High-Res PWM 8-ch. + PWM 4-ch.	MC PWM 12-ch.	4x Analog CMP + 6-bit DAC	2x HS ADC 8-ch./12-bit with PGA	Timers	SAR ADC 16-ch./16-bit

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Digital Signal Controllers

Features and Benefits

- High-resolution PWM with 312 picosecond resolution enables higher switching frequencies, reducing cost and increasing efficiency
- 2x 12-bit high-speed (HS) ADCs with up to 3.3 MSPS resolution improves system accuracy by reducing jitter on input values
- 100 MHz/100 MIPS 32-bit core provides math capabilities needed for advanced power efficiency and motor control applications
- 64 KB to 288 KB flash memory flexibility provides scalability needed for key digital power and motor control applications
- Single-cycle math computations, fractional arithmetic support and parallel moves improves performance, driving tighter and faster control loops
- Direct memory access (DMA) controller reduces core interruption, increasing performance
- Four analog comparators with integrated 6-bit DACs speed system event identification and emergency shutdown of the PWM outputs
- 5 volt-tolerant I/O provides design flexibility and system cost reduction
- Memory protection capability increases system safety by restricting user code from accessing key memory locations and peripherals reserved for supervisor access
- FlexMemory EEPROM provides scratch pad for calibration and shutdown values
- Market-focused software components, reference designs and development tools provide application expertise in the form of runtime software, schematics and other key time to market needs

Development Tools

TWR-56F8400-KIT

A cost-effective development board that is part of the Freescale Tower System—a modular development platform that enables rapid prototyping and re-use through reconfigurable hardware. The kit comes complete with the TWR-56F8400 MCU board, elevator cards, three-phase low-voltage motor control peripheral board and software that demonstrates control of the motor via the Tower System and FreeMASTER. The TWR-56F8400 is also available as a stand-alone card.

TWR-MC-LV3PH

Three-phase low-voltage motor control peripheral module for TWR-56F8400 used to develop DC, BLDC and PMSM motor control solutions using various algorithms provided by Freescale.

Package Options

Part Number	Speed	Package	Flash Size	SRAM Size	Key Features
MC56F84789 MC56F84786	100 MHz	100-pin LQFP 80-pin LQFP	288 KB Inc. 32 KB FlexMemory	32 KB	High-Res. PWM, PWM, HS ADC, SAR ADC, 12-bit DAC, CAN
MC56F84769 MC56F84766		100-pin LQFP 80-pin LQFP	160 KB Inc. 32 KB FlexMemory	24 KB	High-Res. PWM, PWM, HS ADC, SAR ADC, 12-bit DAC, CAN
MC56F84763		64-pin LQFP	160 KB Inc. 32 KB FlexMemory	24 KB	High-Res. PWM, HS ADC, SAR ADC, 12-bit DAC, CAN
MC56F84587 MC56F84585	80 MHz	100-pin LQFP 80-pin LQFP	288 KB Inc. 32 KB FlexMemory	32 KB	2 x PWM, HS ADC, SAR ADC, 12-bit DAC, CAN
MC56F84567 MC56F84565		100-pin LQFP 80-pin LQFP	160 KB Inc. 32 KB FlexMemory	24 KB	2x PWM, HS ADC, SAR ADC, CAN
MC56F84553		64-pin LQFP	128 KB Inc. 32 KB FlexMemory	16 KB	High-Res. PWM, HS ADC, SAR ADC, 12-bit DAC, CAN
MC56F84550		48-pin LQFP	128 KB Inc. 32 KB FlexMemory	16 KB	High-Res. PWM, HS ADC, 12b DAC, CAN
MC56F84543		64-pin LQFP	96 KB Inc. 32 KB FlexMemory	8 KB	High-Res. PWM, HS ADC, SAR ADC, 12-bit DAC, CAN
MC56F84540		48-pin LQFP	96 KB Inc. 32 KB FlexMemory	8 KB	High-Res. PWM, HS ADC, 12-bit DAC, CAN
MC56F84462	60 MHz	64-pin LQFP	160 KB Inc. 32 KB FlexMemory	24 KB	PWM, HS ADC, 12-bit DAC, CAN
MC56F84452		64-pin LQFP	128 KB Inc. 32 KB FlexMemory	16 KB	PWM, HS ADC, SAR ADC, CAN
MC56F84451		48-pin LQFP	128 KB Inc. 32 KB FlexMemory	16 KB	PWM, HS ADC, CAN
MC56F84442		64-pin LQFP	96 KB Inc. 32 KB FlexMemory	8 KB	PWM, HS ADC, SAR ADC
MC56F84441		48-pin LQFP	96 KB Inc. 32 KB FlexMemory	8 KB	PWM, HS ADC

TWR-MC-STEPPER

Low-voltage motor control module for TWR-56F8400 used to develop stepper motor control solutions using various algorithms provided by Freescale.

TWR-ELEV Elevator Module

Elevator modules are the basic building blocks of the Freescale Tower System. Designed to connect MCU and peripheral modules, the elevator modules provide the power regulation circuitry and structural integrity needed for all configurations of an assembled Tower System.

CodeWarrior Development Studio for Microcontrollers V10.2

Special Edition Complimentary
Eclipse™ based CodeWarrior Development Studio for Microcontrollers V10.2 is a complete integrated development environment that provides a highly visual and automated framework to accelerate the development of the most complex embedded applications.

Processor Expert

Complimentary
Rapid application design tool that combines easy-to-use component-based application creation with an expert knowledge system.

FreeMASTER

Complimentary
FreeMASTER software represents a sophisticated tool with intuitive navigation that can be used in any application development.

This tool allows control of an application remotely from a user-friendly graphical environment running on a PC. It also provides the ability to view real-time application variables in both textual and graphical form

DSP and Motor Control Libraries: FSLESL56F800ELIBSW

Complimentary Freescale Embedded Software Library V1.0 for MC56F84xxx.

Reference Designs

Freescale provides reference designs to help engineers implement solutions quickly, confidently and with low risk. Our reference designs include the hardware, software and documentation engineers need to reproduce designs in their own facilities. These reference designs have been built and tested as documented. Complimentary gerbers, code and schematics are provided for these reference designs:

- PMSM/BLDC motor control
- LLC resonant converter
- Solar power conversion
- On-line uninterruptable power supply

Learn more at freescale.com/MC56F84xxx, freescale.com/DSC and freescale.com/Tower