



Freescale Digital Signal Controllers

## MC56F84xx

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

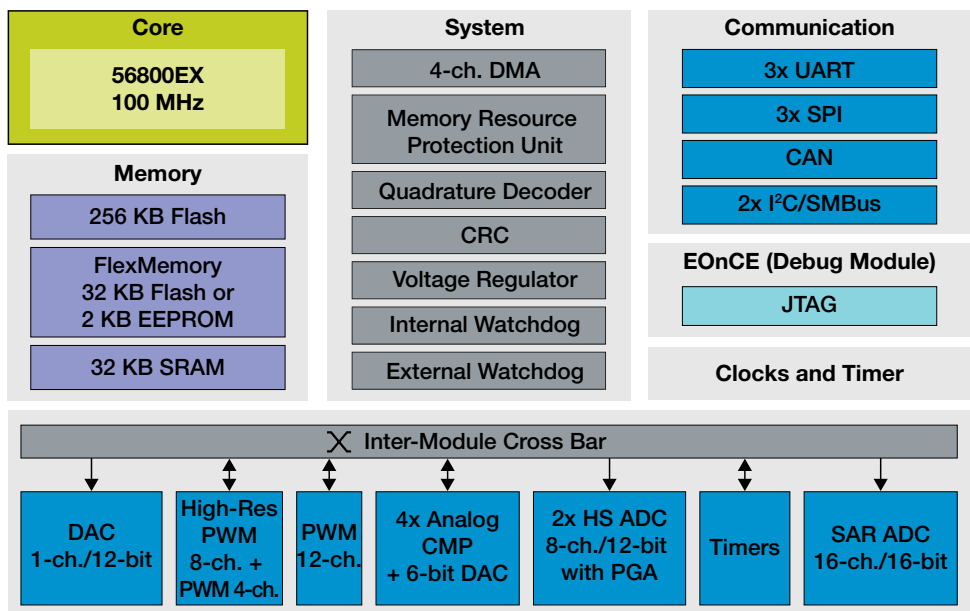
### Target Applications

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

### Overview

The MC56F84xx is the market's fastest digital signal-processing microcontroller, offering exceptional precision, sensing and control for the most efficient digital power conversion and advanced motor control applications. The MC56F84xx includes advanced high-speed and high-accuracy peripherals such as a high-resolution pulse-width modulation (PWM) with 312 pico-second 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 digital signal processing (DSP) core with single-cycle math computation, fractional arithmetic support and parallel moves.

### MC56F84xx



## Features and Benefits

- High-resolution PWM with 312 pico-second 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
- 5V-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
- Freescale's 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 run-time software, schematics and other key time to market needs

## Development Tools

### TWR-56F84789-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-56F84789 MCU board, elevator cards and a three-phase low-voltage motor control peripheral module (TWR-MC-LV3PH). The TWR-56F84789 is also available as a stand-alone card.

### TWR-MC-LV3PH

Three-phase low-voltage motor control peripheral module for TWR-56F84789 used to



## Package Options

Part Number	Speed	Package	Flash Size	Key Features
MC56F84789	100 MHz	80-pin LQFP 100-pin LQFP	256 KB + 32 KB FlexMemory	High-Res. PWM, PWM, HS ADC, SAR ADC, EEPROM, DAC, CAN
MC56F84769	100 MHz	80-pin LQFP 100-pin LQFP	128 KB + 32 KB FlexMemory	High-Res. PWM, PWM, HS ADC, SAR ADC, EEPROM, DAC, CAN
MC56F84763	100 MHz	80-pin LQFP 100-pin LQFP	128 KB + 32 KB FlexMemory	High-Res. PWM, HS ADC, EEPROM, DAC, CAN
MC56F84743	100 MHz	64-pin LQFP 80-pin LQFP	64 KB + 32 KB FlexMemory	High-Res. PWM, HS ADC, EEPROM, DAC, CAN
MC56F84760	100 MHz	48-pin LQFP 64-pin LQFP	128 KB	High-Res. PWM, HS ADC, EEPROM, DAC
MC56F84585	80 MHz	80-pin LQFP 100-pin LQFP	256 KB + 32 KB FlexMemory	High-Res. PWM, PWM, HS ADC, EEPROM, DAC
MC56F84565	80 MHz	80-pin LQFP 100-pin LQFP	128 KB + 32 KB FlexMemory	High-Res. PWM, PWM, HS ADC, EEPROM, DAC
MC56F84461	60 MHz	48-pin LQFP 64-pin LQFP	128 KB	PWM, HS ADC, CAN
MC56F84441	60 MHz	48-pin LQFP 64-pin LQFP	64 KB	PWM, HS ADC

develop DC, BLDC and PMSM motor control solutions using various algorithms provided by Freescale.

### TWR-MC-STEPPER

Low-voltage motor control module for TWR-56F84789 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 microcontroller 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: CW-56800E-DSC 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.

### MQX™ RTOS

#### Complimentary

Accelerate design success with a complimentary RTOS that is simple to fine tune custom applications and scalable to fit requirements.

### DSP and Motor Control Libraries: FSLES156F800ELIBSW

Complimentary Freescale Embedded Software Library V1.0 for MC56FX84xx.

## Reference Designs

Freescale gladly 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
- High wattage AC to DC conversion
- Quarter brick DC to DC conversion

Learn more at [freescale.com/MC56F84xx](http://freescale.com/MC56F84xx), [freescale.com/DSC](http://freescale.com/DSC) and [freescale.com/Tower](http://freescale.com/Tower)

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