Overview

The MC56F823xx/7xx is a low-power DSP MCU family, offering outstanding power consumption at run time in a compact 5 x 5 mm package with exceptional performance, precision and control for high-efficiency digital power conversion (MC56F827xx) and advanced motor control (MC56F823xx) applications. The MC56F827xx includes advanced high-speed and high-accuracy peripherals such as high-resolution pulse width modulation (PWM) with 312 pico-second resolution, dual high-speed 12-bit analog-to-digital converters (ADCs) with built-in PGA sampling up to 1.25 mega samples per second (MSPS) at 12 bits. Faster application-specific control loops are driven via a 32-bit DSP core with single-cycle math computation, fractional arithmetic support and parallel moves.

Target Applications

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

MC56F823xx and MC56F827xx

Half the power with twice the performance for energy-efficient applications

Freescale DSCs

MC56F823xx and MC56F827xx

32-bit Core

System

Security and Integrity

Communication

Timers

EOnCE (Debug Module)

JTAG

56800EX

Up to 100 MHz

Memory

Inter-Module Crossbar with Logic

Voltage Reference

Memory Resource Protection

HS ADC, 8-ch/12-bit with PGA

HS ADC, 8-ch/12-bit with PGA

12-bit DAC

12-bit DAC

4x ACMP with 6-bit DAC

4-ch, DMA

Dual Watchdog w/Ext. Source

Loss Clock Detection

IP/SMBus

2x UART

2x SPI

CAN

High-Resolution PWM 8-ch. (MC56F827xx only)

PWM 8-ch. (MC56F823xx only)

4-ch, 16-bit Timer

2x PITs

Phase-Locked Loop

Crystal OSC

8 MHz OSC

200 KHz OSC

Optional
Features and Benefits

- Low-power operation enables higher system efficiency due to lower power losses
- 5 mm x 5 mm package option enables compact PCB design for space-constrained applications while still providing the precision and control needed
- 50/100 MHz 32-bit core provides math capabilities needed for advanced power efficiency and motor control applications
- Single-cycle math computations, fractional arithmetic support and parallel moves improve performance, driving tighter and faster control loops
- High-resolution PWM with 312 pico-second resolution enables higher switching frequencies, reducing cost and increasing efficiency
- Two 12-bit high-speed (HS) ADCs with up to 1.25 MSPS resolution improve system accuracy by reducing jitter on input values
- 16 KB to 64 KB flash memory provides scalability needed for key digital power and motor control applications
- Pin to pin compatible with the MC56F84xxx and MC56F824x/5x families for performance and peripheral scalability
- 5 V-tolerant I/O provides design flexibility and system cost reduction
- 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
- Memory protection capability increases system safety by restricting user code from accessing key memory locations and peripherals reserved for supervisor access

Package Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Speed</th>
<th>Flash Size</th>
<th>SRAM Size</th>
<th>Key Features</th>
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<tr>
<td>MC56F82748</td>
<td>64-pin LQFP</td>
<td>64 KB</td>
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<td>High-Res PWM, 12-bit DAC, HS ADC, MSCAN</td>
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<td>32 KB</td>
<td>4 KB</td>
<td>Motor Control PWM, HS ADC</td>
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</table>

Development Tools

TWR-56F8200

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 TWR system comes complete with the TWR-56F8200 MCU board, P&E Multilink Universal development interface, USB cable, software and instructions on how to control the TWR-MC-LV3PH motor via the Tower System and FreeMASTER.

TWR-MC-LV3PH

Turns your Tower System development tool into a complete motor control reference design kit that includes a BLDC motor. This three-phase low-voltage motor control peripheral module for the TWR-56F8200 is used to develop DC, BLDC and PMSM motor control solutions using various algorithms provided by Freescale. BLDC motor control demonstration software is included with the TWR-56F8200. For more information on the TWR-MC-LV3PH, visit freescale.com/TWR-MC-LV3PH.

CodeWarrior Development Studio for Microcontrollers V10.4

Complimentary Special Edition Eclipse-based CodeWarrior Development Studio for Microcontrollers V10.4 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 Software Modeling Tool

Complimentary rapid application design tool that combines easy-to-use, component-based application creation with an expert knowledge system, delivering source code for the MC56F827xx.

FreeMASTER

Complimentary user-friendly, real-time debug monitor and data visualization tool for application development and information management. Supporting nonintrusive variable monitoring on a running system, FreeMASTER allows the data from multiple variables to be viewed in an evolving oscilloscope-like display or in a common text format.

Learn more at freescale.com/MC56F827xx and freescale.com/TWR-56F8200