Ultra-High-Voltage (UHV) MCU for motor control

MC9S08SUx MCU Family
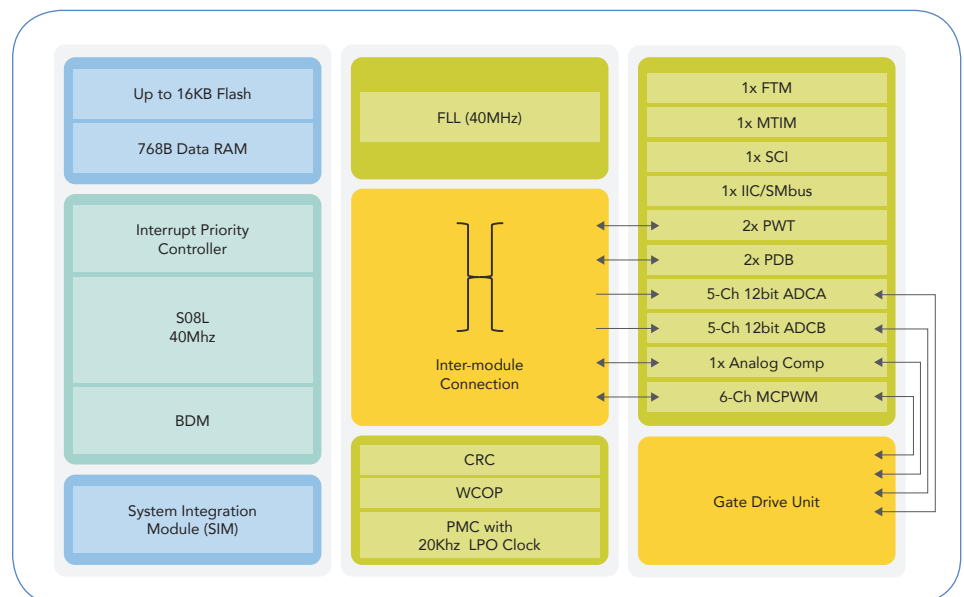
APPLICATIONS

▸ BLDC power tool

▸ BLDC step motor

▸ Cordless power tool

▸ DC fan

▸ Drone ESC

▸ Healthcare

▸ Robots

OVERVIEW

The MC9S08SUx MCU family is NXP's ultra-high-voltage (UHV) subset of 8-bit S08 MCUs. It offers a single-chip solution for low-end 4.5V-18V motor control applications with lower BOM cost and tighter integration. Based on the HSC08 core, the MC9S08SUx MCU family achieves high-performance while maintaining low cost using the enhanced S08L central processor unit with 3-phase MOSFET pre-drivers unit that supports 3 high-side PMOSes and 3 low-side NMOSes, amplifiers for current measurement, over current protection (OCP) and over voltage protection (OVP). The small form factor (4x4 mm QFN) enables tight integration and easy layout for space-constrained applications. Three HV phase comparator realizes sensor-less control. Over current/voltage protection is also integrated.

MC9S08SUx MCU FAMILY BLOCK DIAGRAM

Up to 16KB Flash		1x FTM
768B Data RAM	FLL (40MHz)	1x MTIM
		1x SCI
Interrupt Priority Controller		1x IIC/SMbus
		2x PWT
S08L 40Mhz	Inter-module Connection	2x PDB
		5-Ch 12bit ADCA
		5-Ch 12bit ADCB
BDM		1x Analog Comp
		6-Ch MCPWM
System Integration Module (SIM)	CRC	Gate Drive Unit
	WCOP	
	PMC with 20Khz LPO Clock	

Compared against discrete device solutions for motor control, save up to 50% PCB size and layer by using the MC9S08SUx MCU family. With the reduced number of components on the PCB, enjoy enhanced system reliability. The MC9S08SUx MCU family is ideal for space-constrained applications such as power tools and drone ESC.

DEVELOPMENT TOOLS

CodeWarrior Development Studio V10.x

CodeWarrior Development Studio for microcontrollers is a suite of tools that supports software development for S08, ColdFire and Kinetis MCU families.

Sensorless BLDC Control Reference Design

Compact PCB three-phase sensorless BLDC control reference design with 3x P+N MOSFET pairs, single PWM speed control.

FEATURES AND BENEFITS

Features	Benefits
Central Processing Unit	
Up to 40 MHz HCS08 CPU frequency with 4.5 V to 18V operating voltage across temperature range of -40°C to +105°C	High CPU performance. Removes external PMU or LDO which converts the supply voltage to 3V or 5V.
On-Chip Memory	
Up to 8/16 KB non-volatile flash, 768 bytes internal system RAM	Enhances in-application re-programmability; reduces development time.
System and Security	
Windowed COP watchdog (WCOP)	Resets system when application software fails to execute as expected.
Cyclic redundancy check (CRC)	Generates CRC code for error detection.
High Voltage Gate Drive Unit	
3x high-side PMOS pre-driver, 3x low-side NMOS pre-driver	Single-chip solution for 3-phase motor control applications.
2x current sensing Op-Amp and OCP, Vsup OVP	Provides over current/voltage protection.
Clock Source Options	
Internal clock source (ICS) module with ICSIRCLK and FLL	Provides accurate on-chip clock source and saves cost by eliminating the need for external clock components.
Low-power oscillator (LPO)	Provides standalone low-frequency clock source in all power modes.
Feature-Rich Integration	
1x 6-ch MCPWM	PWM signal generation with automatic dead-time insertion.
1x 2-ch FlexTimer (FTM)	Supports input capture, output compare, and the generation of PWM signals.
1x 16-bit module timer (MTIM)	A timer with several software selectable clock sources and a programmable interrupt.
2x 16-bit pulse width timers (PWT)	Captures a pulse width and pulse period.
2x 5-channel 12-bit analog-to-digital converter (ADC)	Provides fast and easy conversion of analog inputs.
1x analog comparator (ACMP)	Analog comparator with built in DAC which continues to operate in Wait and Stop mode.
1x SCI, 1x IIC/SMBus	Choice of various communication interfaces.

MC9S08SUX MCU FAMILY OPTIONS

Part Number	Flash	Package	Temperature Range
MC9S08SU16VFK	16KB	24-pin QFN 4 x 4 x 0.65 Pitch 0.5 mm	-40 to 105 °C
MC9S08SU8VFK	8KB	24-pin QFN 4 x 4 x 0.65 Pitch 0.5 mm	-40 to 105 °C