MC9S08QD4/2

Target Applications

- DC cooling fan applications • Computers
 - Low-power supplies
- Battery chargers
- Digital capacitive discharge ignition (CDI) for motorcycles
- Industrial compressors
- Camera zoom control
- Walkie-talkies

- Vacuum cleaners
- Small and large appliances
 - Toasters

 - microwaves
- coprocessors
- Fan control
- AC voltage line monitors

Overview

The MC9S08QD4/2 provides design flexibility and integrated functionality for small appliances and DC fans. The QD includes up to 5.5V supply voltage, a 10-bit analogto-digital converter (ADC) and two timers for improved motor control. The MC9S08QD extends the advantages of the low-end S08 core as a low pin count, small package 8-bit MCU. With pin and tool compatibility with MC9RS08KA and MC9S08QG8, the QD allows designers to move up and down the performance chain quickly and easily.

Data Sheets

MC9S08QD MC9S08QD Data Sheet

S08 CPU			
Up to 4K flash	4 KBI		
256B RAM	4-ch., 10-bit ADC		
ICS (0.2% resolution, 2% deviation)	1 x 1-ch., 16-bit timer		
COP	1 x 2-ch., 16-bit timer		
LVD	4 GPIO plus 1 in and 1 out		

- Low-end
- Industrial control
- Watchdog
- Security systems

Features

8-bit HCS08 Central Processor Unit (CPU) • Up to 8 MHz S08 CPU for 125 ns minimum

- instruction time HC08 instruction set with added
- background instruction Support for up to 32 interrupt/reset sources
- Supply voltage range of 2.7–5.5V

Integrated Third-Generation Flash Memory and RAM

• Embedded flash that is in-application reprogrammable over the full operating voltage and temperature range with a single power supply

General Purpose Input/Output (GPIO) Lines

- Outputs 10 mA each; 100 mA max for package
- Four general-purpose input output (GPIO)
- One input-only and one output-only line
- Software selectable pull-ups on ports when used as input; internal pull-up on reset and interrupt request (IRQ) pin
- · Software selectable slew rate control and drive strength on ports when used as output
- 4-pin keyboard interrupt module with software selectable polarity on edge or edge/ level modes
- 1-ch. timer/pulse-width modulator; each channel can be used for input capture, output compare, buffered edge-aligned PWM or buffered center-aligned PWM
- · Software-selectable pull-ups on ports when used as input; internal pull-up
- Software-selectable slew rate control and drive strength on ports when used as output
- Single-wire background debug interface
- 8-pin plastic dual-inline package (PDIP) and 8-pin narrow body small outline integrated circuit (SOIC) packages
- Internal pull-up on reset and IRQ pin

· High-current I/O allows direct drive of LED and other circuits to virtually eliminate external drivers and to help reduce system costs

· Backward object-code compatibility with

68HC08 and 68HC05 allows existing code

· Allows for efficient, compact module coding

· Allows for software flexibility and optimization

Greater scalability of power and performance

through range of voltage for application needs

• Provides users a single solution for multiple

platforms or a single platform that is field

reprogrammable in virtually any environment

Allows for software flexibility and optimization

- Helps to reduce customer system cost by eliminating need for external resistors
- · Can configure ports for slower slew rate and weaker drive to minimize noise emissions from the MCU
- Keyboard scan with programmable pull-ups/ pull-downs virtually eliminates external glue logic when interfacing to simple keypads
- Reduce customer system cost

Benefits

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libraries to be used

in assembly or C compiler

for real-time applications

for real-time applications



Features	Benefits	COST-EMECTIVE	Cost-Effective Development Tools		
Integrated Analog Peripherals		For more informat	ion on deve	lopment tools,	
 4-ch., 10-bit ADC with automatic 	Can be used to run ADC when MCU clocks	please refer to the Freescale Development			
compare function	are off, such as in STOP3 low-power mode	Tool Selector Guide (keyword search SG1011			
 ADC channel connected to on-chip temperature sensor Automatic compare function, software 	Calculates temperature without any external components and saves an ADC input channel for other use	DEMO9S08QD4		US\$5	
 programmable for greater-than, equal-to or less-than conditions Asynchronous clock source Temperature sensor Internal bandgap reference channel 	 Constant voltage source for calibrating ADC results requires no external components Takes periodic measurements without CPU involvement; can be used in STOP3 with compare function to take measurement and wake MCU from STOP3 only when compare 	Cost-effective demonstration board with potentimeter, LEDs, serial port and built- in USB-BDM cable for debugging and programming			
 Hardware triggerable using the real-time interrupt counter 	ising the real-time level is reached • Flexible configuration to meet high			US\$49	
 Low-power and high-speed options Can be used for single slope APC and resistance-capacitance time Easy interface to analog inputs/sensors Used to set conversion complete and generate interrupt only when result 	performance and low power requirements	HC08/HCS08/HC12/HCS12 stand-alone flas programmer or in circuit emulator, debugger, flash programmer; USB, serial or Ethernet interface options			
matches condition		USBMULTILINKBI	OME	US\$9	
Flexible Clock Options					
 Internal clock source module containing a frequency-locked loop controlled by internal reference 	 Can eliminate cost of external clock components, use little board space and help to increase system reliability Universal HC08 in-circuit debugger an programmer; USB-PC interface 		00		
		CWX-HXX-SE		Complimentary	
Two Timer Modules		CodeWarrior [®] Spe	cial Edition	for HC(S)08/	
 Programmable 16-bit timer/PWM (TPM) module 2-ch. TPM; each channel can be used for input capture, output compare, buffered edge-aligned pulse width modulation (PWM) or buffered center-aligned PWM 1 x 1-ch., 16-bit timer 1 x 2-ch., 16-bit timer 	 One of the most cost-effective and flexible timer modules; each channel is independently programmable for input capture, output compare or buffered edge-aligned PWM or buffered center-aligned PWM Timer overflow interrupt can be enabled to generate periodic interrupts for time-based software loops Two separate time bases provide different interrupt options 	CodeWarrior [®] Special Edition for HC(S)08/ RS08 MCUs includes integrated development environment, linker, debugger, unlimited assembler, Processor Expert [™] auto-code generator, full-chip simulation and 16 KB C compiler *Prices indicated are MSRP **Subject to license agreement and registration			
System Protection		Package Option	ns		
 Watchdog computer operating properly reset with option to run from dedicated 1 kHz 	Resets device in instance of runaway or corrupted code, and independent clock	Part Number	Package	Temp. Range	
internal clock source or bus clock	source provides additional protection in case	MC9S08QD2CSC	8-pin SOIC	-40° C to +85°	
 Low-voltage detection with reset or interrupt Illegal opcode detection with reset Flexible flash block protection Security feature for flash and RAM Always-on power-on reset circuitry 	of loss of clock Allows system to write/save important 	MC9S08QD2CSC	8-pin SOIC	-40° C to +85°	
	variables before voltage drops too low		•		
	Can hold device in reset until reliable voltage levels are reapplied to the part	MC9S08QD4CSC	8-pin SOIC	-40° C to +85°	
	 Helps to secure code sections so that they 	MC9S08QD4CPC	8-pin PDIP	-40° C to +85°	
	cannot be accidently corrupted by runaway	MC9S08QD4VSC	8-pin SOIC	-40° C to +105°	
	codeOption to protect various block sizes	MC9S08QD4VPC	8-pin PDIP	-40° C to +105°	
	Option to put bootloader code in protected	MC9S08QD4MSC	8-pin SOIC	-40° C to +125°	
	 space and clear flash for reprogramming Helps prevent unauthorized access to memory to protect a customer's software 	MC9S08QD4MPC	8-pin PDIP	-40° C to +125°	

For current information about Freescale products and documentation, please visit www.freescale.com/QD.

Learn More:



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