

S08QD Family

Small footprint for a host of entry level automotive applications



Overview

The S08QD family is the latest in 8-bit microcontrollers (MCUs) for automotive applications from Freescale. The S08QD family offers an entry point into automotive S08 devices for general purpose, low end, space-constrained applications. These QD MCUs are compatible and scalable with other low-end to mid-range automotive S08 products.

Target Applications

- Watchdog coprocessors
- Actuators
- HVAC dampeners
- LED drivers
- Push button control
- Sensors/meters
- Mirror dimming

Key Benefits

- Smallest automotive package option (8-pin SOIC)
- Cost optimized
- Flash for code flexibility
- Range of temperature options available

Features	Benefits
8-bit HCS08 Central Processor Unit (CPU)	
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Backward object-code compatibility with 68HC08 and 68HC05 allows existing code libraries to be used • Allows for efficient, compact module coding in assembly or C compiler • Allows for software flexibility and optimization for real-time applications • Greater scalability of power and performance through range of voltage for application needs
Integrated Third-Generation Flash Memory and RAM	
<ul style="list-style-type: none"> • Embedded flash that is in-application reprogrammable over the full operating voltage and temperature range with a single power supply 	<ul style="list-style-type: none"> • 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 for real-time applications
General Purpose Input/Output (GPIO) Lines	
<ul style="list-style-type: none"> • 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 narrow body small outline integrated circuit (SOIC) packages • Internal pull-up on reset and IRQ pin 	<ul style="list-style-type: none"> • High-current I/O allows direct drive of LED and other circuits to virtually eliminate external drivers and to help reduce system costs • 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

Device	Core	Flash	RAM	Analog (ADC)	Timer	Clock	Pin Count	Additional Features
9S08QD4	S08	4 KB	256B	4-ch., 10-bit ADC	2-ch. + 1-ch.	ICS	8	16 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor
9S08QD2	S08	2 KB	128B	4-ch., 10-bit ADC	2-ch. + 1-ch.	ICS	8	16 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor

Features	Benefits
Integrated Analog Peripherals <ul style="list-style-type: none"> • 4-ch., 10-bit ADC with automatic compare function • ADC channel connected to on-chip temperature sensor • Automatic compare function, software programmable for greater-than, equal-to or less-than conditions • Asynchronous clock source • Temperature sensor • Internal bandgap reference channel • Hardware triggerable using the real-time interrupt counter • 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 matches condition 	<ul style="list-style-type: none"> • Can be used to run ADC when MCU clocks are off, such as in STOP3 low-power mode • Calculates temperature without any external components and saves an ADC input channel for other use • 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 level is reached • Flexible configuration to meet high performance and low power requirements
Flexible Clock Options <ul style="list-style-type: none"> • Internal clock source module containing a frequency-locked loop controlled by internal reference 	<ul style="list-style-type: none"> • Can eliminate cost of external clock components, use little board space and help to increase system reliability
Two Timer Modules <ul style="list-style-type: none"> • Two programmable 16-bit timer/PWM modules <ul style="list-style-type: none"> ◦ 1 x 1-ch., 16-bit timer ◦ 1 x 2-ch., 16-bit timer • Each channel can be used for input capture, output compare, buffered edge-aligned pulse width modulation (PWM) or buffered center-aligned PWM 	<ul style="list-style-type: none"> • 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
System Protection <ul style="list-style-type: none"> • Watchdog computer operating properly reset with option to run from dedicated 1 kHz internal clock source or bus clock • 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 	<ul style="list-style-type: none"> • Resets device in instance of runaway or corrupted code, and independent clock source provides additional protection in case of loss of clock • Allows system to write/save important variables before voltage drops too low • Can hold device in reset until reliable voltage levels are reapplied to the part • Helps to secure code sections so that they cannot be accidentally corrupted by runaway code • Option to protect various block sizes • Option to put bootloader code in protected space and clear flash for reprogramming • Helps prevent unauthorized access to memory to protect a customer's software

Cost-Effective Development Tools

DEMO9S08QD4 **US\$59***

Cost-effective demonstration board with potentiometer, LEDs, serial port and built-in USB-BDM cable for debugging and programming

CYCLONEPROE **US\$499***

HC08/HCS08/HC12/HCS12 stand-alone flash programmer or in circuit emulator, debugger, flash programmer; USB, serial or Ethernet interface options

USBMULTILINKBDME **US\$99***

Universal HC08 in-circuit debugger and flash programmer; USB-PC interface

CWX-HXX-SE **Complimentary****

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

Package Options

Part Number	Package	Temp. Range
S9S08QD2J1MSC	8-pin SOIC	-40°C to +125°C
S9S08QD2J1VSC	8-pin SOIC	-40°C to +105°C
S9S08QD2J1CSC	8-pin SOIC	-40°C to +85°C
S9S08QD4J1CSC	8-pin SOIC	-40°C to +85°C
S9S08QD4J1VSC	8-pin SOIC	-40°C to +105°C
S9S08QD4J1MSC	8-pin SOIC	-40°C to +125°C



8-pin SOIC
3.9 mm x 4.9 mm body
50 mil/1.27 mm pitch

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