



**THE DATASHEET OF  
MC9S08QE64CLH**



# MC9S08QE128

## 8-bit Fact Sheet



### Target Applications

- Health care monitoring and instrumentation
- HVAC and building control
- Gas, water and heater meters
- Security cameras
- Digital cameras
- Measurement equipment

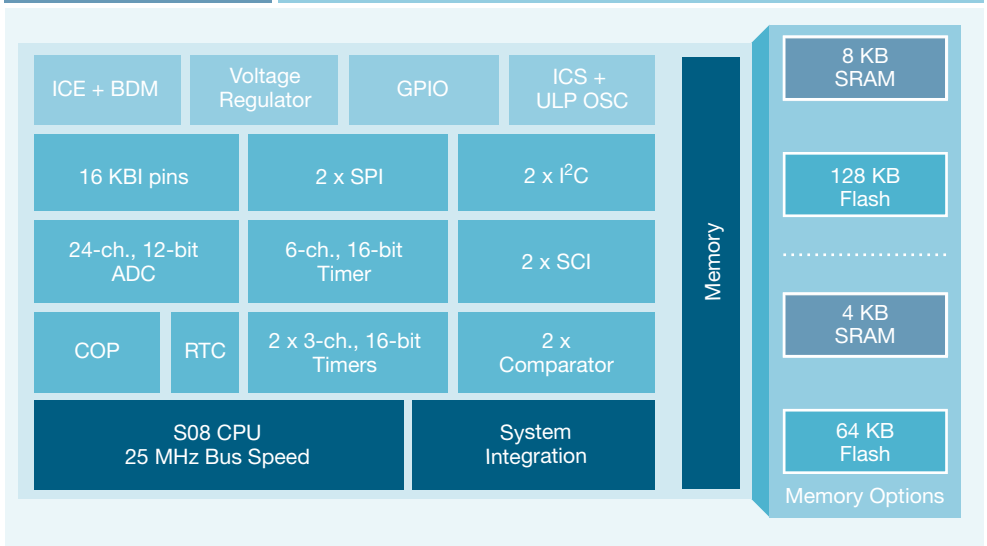
### Overview

The Flexis™ series of controllers is the connection point on the Freescale Controller Continuum, where 8- and 32-bit compatibility becomes reality. The Flexis series includes complementary families of 8-bit S08 and 32-bit ColdFire® V1 microcontrollers that share a common set of peripherals and development tools to deliver the ultimate in migration flexibility. The QE family, comprised of a pin-compatible 8-bit and 32-bit device duo, is the first family in the Flexis series.

The S08QE128 device pushes the boundaries of 8-bit performance with up to 128 KB of flash memory and a 24-channel, 12-bit analog-to-digital converter (ADC). The S08QE128 includes up to 3.6V supply voltage, a 50 MHz CPU core and three timers for improved motor control—perfect for health care monitoring instrumentation and electronics such as digital and web cameras.

The 8-bit S08QE128 is pin-, peripheral- and tool-compatible with the 32-bit MCF51QE128 device, providing unprecedented design freedom across the performance spectrum.

S08QE128 Block Diagram



Features	Benefits
<b>8-bit HCS08 Central Processing Unit (CPU)</b> <ul style="list-style-type: none"> <li>• Up to 50.233 MHz HCS08 CPU from 2.1V to 3.6V, and 20 MHz CPU at 1.8V to 2.1V across temperature range of -40°C to +85°C</li> <li>• HCS08 instruction set with added BGND instruction</li> </ul>	<ul style="list-style-type: none"> <li>• Offers high performance, even at low voltage levels for battery-operated applications</li> <li>• Provides bus speed operation of 25.117 MHz from 2.1V to 3.6V and 10 MHz from 1.8 to 2.1V</li> <li>• Easy to learn and use architecture</li> <li>• Backward object code compatibility with 68HC08 and 68HC05 for reuse of existing libraries can still be used</li> <li>• Allows for efficient, compact module coding in assembly or C compiler</li> <li>• BGND allows user to enter background debug mode that takes advantage of on-chip in-circuit emulator (ICE)</li> </ul>
<ul style="list-style-type: none"> <li>• Support for up to 32 interrupt/reset sources</li> </ul>	<ul style="list-style-type: none"> <li>• Allows for software flexibility and optimization for real-time applications</li> </ul>
<b>On-Chip Memory</b> <ul style="list-style-type: none"> <li>• Up to 128 KB flash read/program/erase over full operating voltage and temperature</li> <li>• Up to 8 KB random-access memory (RAM)</li> </ul>	<ul style="list-style-type: none"> <li>• Allows user to take full advantage of in-application, reprogrammability benefits in virtually any environment</li> <li>• Security circuitry prevents unauthorized access to RAM and flash contents to reduce system power consumption</li> </ul>
<b>Power-Saving Modes</b> <ul style="list-style-type: none"> <li>• Two ultra-low-power (ULP) stop modes, one of which allows limited use of peripherals</li> <li>• New ULP power wait mode</li> <li>• 6 μs typical wake up time from stop3 mode</li> <li>• Internal clock Source (ICS)—Module containing a frequency locked-loop (FLL) controlled by internal or external reference</li> <li>• Oscillator (OSC)—Loop-control Pierce oscillator; crystal or ceramic resonator range of 31.25 kHz to 38.4 kHz or 1 MHz to 16 MHz</li> </ul>	<ul style="list-style-type: none"> <li>• Allows continued application sampling in a reduced power state which extends battery life</li> <li>• Eliminates use of an external clock source. This ultimately reduces system costs associated with development</li> <li>• Includes ultra-low-power OSC for accurate timebase in low-power modes</li> </ul>

Features	Benefits
<b>Peripherals</b>	
<ul style="list-style-type: none"> <li>Two analog comparators with option to compare to an internal reference—output can be optionally routed to timer/pulse width modulator (PWM) as input capture trigger</li> </ul>	<ul style="list-style-type: none"> <li>Requires only single pin for input signal, freeing additional pins for other use</li> <li>Allows other components in system to see result of comparator with minimal delay</li> <li>Can be used for single slope ADC and RC time constant measurements</li> </ul>
<ul style="list-style-type: none"> <li>Analog Digital Converter (ADC)—24-channel, 12-bit resolution; 2.5 <math>\mu</math>s conversion time; automatic compare function; 1.7 mV/<math>^{\circ}</math>C temperature sensor; internal bandgap reference channel; operation in stop3</li> </ul>	<ul style="list-style-type: none"> <li>Having 24 channels allows up to 24 analog devices to be sampled at extremely high speeds. Full functionality across operational voltage of the MCU</li> </ul>
<ul style="list-style-type: none"> <li>2x Serial Communications Interface (SCI)—Two modules offering asynchronous communications, 13-bit break option, flexible baud rate generator, double buffered transmit and receive and optional H/W parity checking and generation</li> </ul>	<ul style="list-style-type: none"> <li>Provides standard UART communications peripheral</li> <li>Allows full-duplex, asynchronous, NRZ serial communication between MCU and remote devices</li> <li>Edge interrupt can wake up MCU from low-power mode</li> </ul>
<ul style="list-style-type: none"> <li>2x SCI (Serial Peripheral Interfaces)—Two modules with full-duplex or single-wire bidirectional; double-buffered transmit and receive; master or slave mode; MSB-first or LSB-first shifting</li> </ul>	<ul style="list-style-type: none"> <li>Having two SPI provides dedication to two separate devices. An example would be to have one SPI dedicated to a ZigBee<sup>®</sup>-ready transceiver and the other for MCUs or peripherals</li> </ul>
<ul style="list-style-type: none"> <li>Time pulse-width modulation (TPM)—one 6-channel (TMP3) and two 3-channel (TPM1 and TPM2); selectable input capture, output compare, or buffered edge- or center-aligned PWM on each channel</li> </ul>	<ul style="list-style-type: none"> <li>Three TPMs allow for three different time bases, with a total of twelve timer channels</li> </ul>
<ul style="list-style-type: none"> <li>Two I<sup>2</sup>C with up to 100 kbps with maximum bus loading; multi-master operation; programmable slave address; interrupt-driven byte-by-byte data transfer; supports broadcast mode and 10-bit addressing</li> </ul>	<ul style="list-style-type: none"> <li>Two I<sup>2</sup>C ports enable increased system memory by using an additional I<sup>2</sup>C EEPROM. This also creates an opportunity to add an additional I<sup>2</sup>C device</li> </ul>
<b>Input/Output</b>	
<ul style="list-style-type: none"> <li>70 GPIO (General Purpose Input/Output), one input-only and one output-only pin</li> </ul>	<ul style="list-style-type: none"> <li>Results in large number of flexible I/O pins that allow developers to easily interface device into their own designs</li> </ul>
<ul style="list-style-type: none"> <li>16 Keyboard Interrupts (KBI) pins with selectable polarity</li> </ul>	<ul style="list-style-type: none"> <li>Can be used for reading input from a keypad or used as general pin interrupts</li> </ul>
<b>System Protection</b>	
<ul style="list-style-type: none"> <li>Watchdog computer operating properly (COP) reset with option to run from dedicated 1 kHz internal clock source or bus clock</li> </ul>	<ul style="list-style-type: none"> <li>Allows device to recognize runaway code (infinite loops) and resets processor to avoid lock-up states</li> </ul>
<ul style="list-style-type: none"> <li>Low-voltage detection with reset or interrupt; selectable trip points</li> </ul>	<ul style="list-style-type: none"> <li>Alarms the developer of voltage drops outside of the typical operating range</li> </ul>
<ul style="list-style-type: none"> <li>Illegal op code detection with reset</li> </ul>	<ul style="list-style-type: none"> <li>Allows the device to recognize erroneous code and resets the processor to avoid lock-up states</li> </ul>
<ul style="list-style-type: none"> <li>Flash block protection</li> </ul>	<ul style="list-style-type: none"> <li>Prevents unintentional programming of protected flash memory, which greatly reduces the chance of losing vital system code for vendor applications</li> </ul>
<b>Development Support</b>	
<ul style="list-style-type: none"> <li>Single-wire background debug interface</li> </ul>	<ul style="list-style-type: none"> <li>Allows developers to use the same hardware cables between S08 and ColdFire V1 platforms</li> </ul>
<ul style="list-style-type: none"> <li>Breakpoint capability</li> </ul>	<ul style="list-style-type: none"> <li>Allows single breakpoint setting during in-circuit debugging (plus three more breakpoints in on-chip debug module)</li> </ul>
<ul style="list-style-type: none"> <li>ICE debug module containing three comparators and nine trigger modes. Eight deep FIFO for storing change-of-flow addresses and event-only data—debug module supports both tag and force breakpoints</li> </ul>	<ul style="list-style-type: none"> <li>Provides built-in full emulation without expense of traditional emulator</li> </ul>

Package Options		
Part Number	Temp. Range	Package
MC9S08QE128CLK	-40°C to +85°C	80 LQFP
MC9S08QE128CLH	-40°C to +85°C	64 LQFP
MC9S08QE128CFT	-40°C to +85°C	48 QFN
MC9S08QE128CQD	-40°C to +85°C	44 QFP
MC9S08QE128CLC	-40°C to +85°C	32 LQFP
MC9S08QE64CLH	-40°C to +85°C	64 LQFP

### Cost-Effective Development Tools

#### DEMOQE128

\$99\*

Cost-effective demonstration kit, including the S08 and ColdFire<sup>®</sup> V1 daughter cards, as well as a serial port and built-in USB-BDM cable for debugging and programming.

#### EVBQE128

\$325\*

Full-featured evaluation system for the QE128 device family. This evaluation system enables full evaluation of both the MC9S08QE128 and MCF51QE128 devices.

### CodeWarrior<sup>®</sup> Development Studio for Microcontrollers 6.0

#### Complimentary\*\* Special Edition

CodeWarrior Development Studio for Microcontrollers is a single tool suite that supports software development for Freescale's 8- and 32-bit ColdFire V1 microcontrollers. Designers can further accelerate application development with the help of Processor Expert, an award-winning rapid application development tool integrated into the CodeWarrior tool suite.

\* Prices indicated are MSRP



\*\* Subject to license agreement

### Learn More:

For more information about the Flexis QE family, please visit [www.freescale.com/flexis](http://www.freescale.com/flexis).

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View MC9S08QE64CLH on WIN SOURCE](#)
-  [Freescale Semiconductor - NXP Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

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