

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

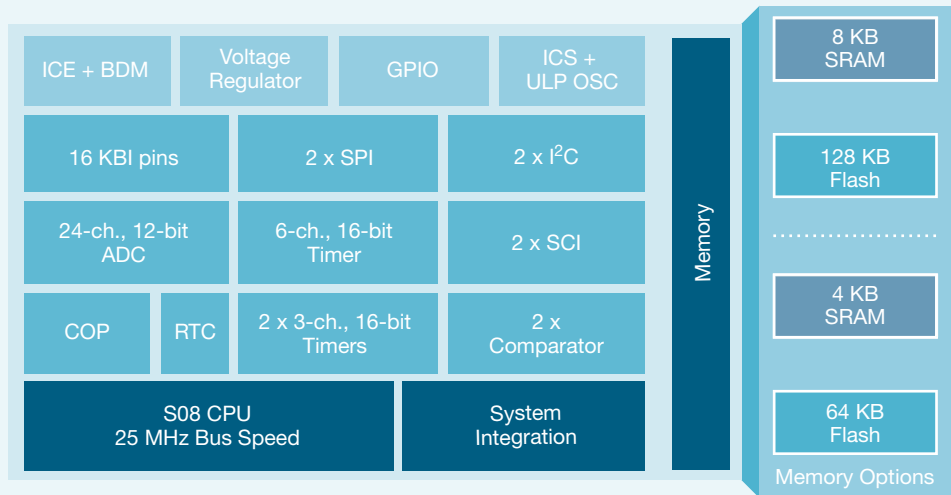
Overview

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
8-bit HCS08 Central Processing Unit (CPU) - 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 - HCS08 instruction set with added BGND instruction - Support for up to 32 interrupt/reset sources	- Offers high performance, even at low voltage levels for battery-operated applications - Provides bus speed operation of 25.117 MHz from 2.1V to 3.6V and 10 MHz from 1.8 to 2.1V - Easy to learn and use architecture - Backward object code compatibility with 68HC08 and 68HC05 for reuse of existing libraries can still be used - Allows for efficient, compact module coding in assembly or C compiler - BGND allows user to enter background debug mode that takes advantage of on-chip in-circuit emulator (ICE) - Allows for software flexibility and optimization for real-time applications
On-Chip Memory - Up to 128 KB flash read/program/erase over full operating voltage and temperature - Up to 8 KB random-access memory (RAM)	- Allows user to take full advantage of in-application, reprogrammability benefits in virtually any environment - Security circuitry prevents unauthorized access to RAM and flash contents to reduce system power consumption
Power-Saving Modes - Two ultra-low-power (ULP) stop modes, one of which allows limited use of peripherals - New ULP power wait mode 6 µs typical wake up time from stop3 mode - Internal clock Source (ICS)—Module containing a frequency locked-loop (FLL) controlled by internal or external reference - 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	- Allows continued application sampling in a reduced power state which extends battery life - Eliminates use of an external clock source. This ultimately reduces system costs associated with development - Includes ultra-low-power OSC for accurate timebase in low-power modes

Features

Peripherals

- 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
- Analog Digital Converter (ADC)—24-channel, 12-bit resolution; 2.5 μ s conversion time; automatic compare function; 1.7 mV/°C temperature sensor; internal bandgap reference channel; operation in stop3
- 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
- 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
- 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
- Two I²C 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

Input/Output

- 70 GPIO (General Purpose Input/Output), one input-only and one output-only pin
- 16 Keyboard Interrupts (KBI) pins with selectable polarity

System Protection

- Watchdog computer operating properly (COP) reset with option to run from dedicated 1 kHz internal clock source or bus clock
- Low-voltage detection with reset or interrupt; selectable trip points
- Illegal op code detection with reset
- Flash block protection

Development Support

- Single-wire background debug interface
- Breakpoint capability
- 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

Benefits

- Requires only single pin for input signal, freeing additional pins for other use
- Allows other components in system to see result of comparator with minimal delay
- Can be used for single slope ADC and RC time constant measurements
- Having 24 channels allows up to 24 analog devices to be sampled at extremely high speeds. Full functionality across operational voltage of the MCU
- Provides standard UART communications peripheral
- Allows full-duplex, asynchronous, NRZ serial communication between MCU and remote devices
- Edge interrupt can wake up MCU from low-power mode
- Having two SPI provides dedication to two separate devices. An example would be to have one SPI dedicated to a ZigBee®-ready transceiver and the other for MCUs or peripherals
- Three TPMs allow for three different time bases, with a total of twelve timer channels
- Two I²C ports enable increased system memory by using an additional I²C EEPROM. This also creates an opportunity to add an additional I²C device

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® 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® 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.