



8-bit S08 embedded controllers

# MC9S08EL32/16 and MC9S08SL16/8

## Embedded slave LIN interface controller (SLIC) and on-chip EEPROM

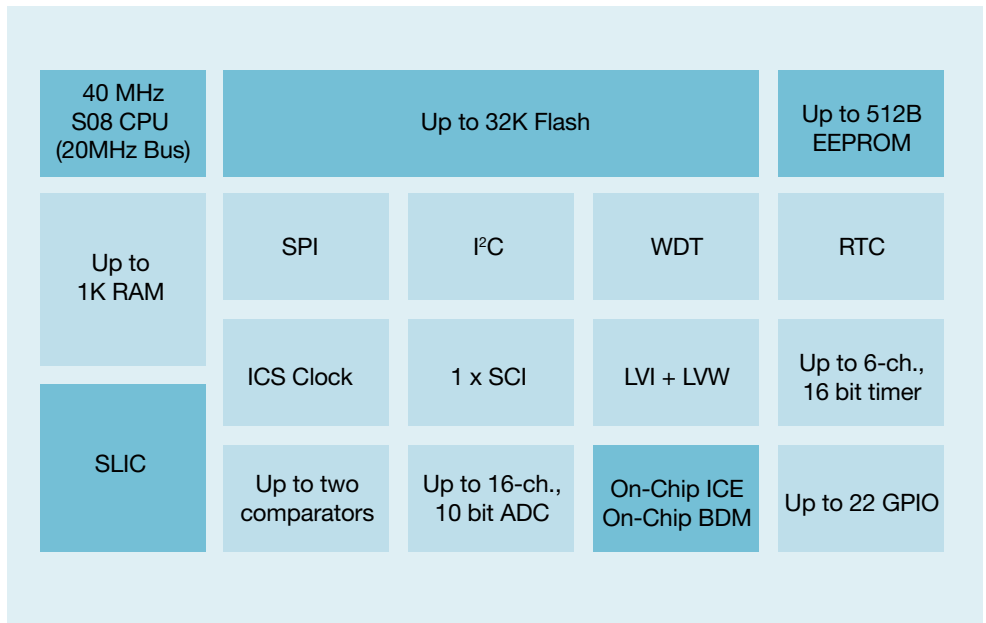
### Target Applications

- Sensors
- Small motors
- Control network systems
- Personal care/hand-held devices
- AC powered consumer goods
- Power tools
- Fire alarms
- Simple media access controller (SMAC)
- Watchdog coprocessors
- Small appliances
- Security systems

### Overview

Freescall Semiconductor's 8-bit EL and SL families of microcontrollers feature best-in-class quality and are designed for general market and LIN slave applications. The EL and SL microcontrollers integrate on-chip EEPROM and embedded slave LIN interface controller (SLIC) to increase performance and save cost for general purpose industrial and consumer applications.

MC90S08EL/SL Block Diagram



Indicates a differentiating feature

Features	Benefits
<b>8-Bit HCS08 Central Processing Unit (CPU)</b>	
<ul style="list-style-type: none"> <li>Up to 20 MHz internal bus (40 MHz HCS08 Core) frequency offering 2.7 to 5.5V across temperature range of -40°C to 85°C</li> </ul>	<ul style="list-style-type: none"> <li>Offers strong performance throughout the entire voltage range</li> </ul>
<b>On-Chip Memory</b>	
<ul style="list-style-type: none"> <li>Up to 32K flash read/program/erase over full operating voltage and temperature</li> </ul>	<ul style="list-style-type: none"> <li>Allows user to take full advantage of in-application, re-programmability benefits in virtually any environment</li> </ul>
<ul style="list-style-type: none"> <li>Up to 512 Bytes EEPROM</li> </ul>	<ul style="list-style-type: none"> <li>Provides board space savings and reduces development time by allowing ability to manipulate diagnostic data at byte level, which provides finer granularity with smaller sector sizes than flash</li> </ul>
<b>Power-Saving Modes</b>	
<ul style="list-style-type: none"> <li>Two very low-power stop modes</li> <li>Reduced power wait mode</li> <li>Very low-power real-time interrupt for use in run, wait, and stop</li> </ul>	<ul style="list-style-type: none"> <li>Offers power control and flexibility where multiple modules can run, while others are powered down</li> <li>Extend battery life using on-chip functionality</li> </ul>
<b>Clock Source Options</b>	
<ul style="list-style-type: none"> <li>Oscillator (XOSC) — Loop-control Pierce oscillator; Crystal or ceramic resonator range of 31.25 kHz to 38.4 kHz or 1 MHz to 16 MHz</li> <li>Internal Clock Source (ICS) — FLL modes; Internal reference clock with trim adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Optimizes power consumption and provides user flexibility</li> <li>Provides accurate on-chip clock source and saves cost by eliminating the need for external components</li> </ul>
<b>Peripherals</b>	
<ul style="list-style-type: none"> <li>Slave LIN interface controller (SLIC)— Supports LIN 2.0 and SAE J2602 protocols; up to 120 kbps, full LIN message buffering, automatic bit rate and frame synchronization, checksum generation and verification, UART-like byte transfer mode</li> </ul>	<ul style="list-style-type: none"> <li>Saves development time by automatically adjusting to LIN speed – no special code changes needed; enables high performance with fewest interrupts on CPU of any known solution; saves cost with use of smaller and simpler driver code</li> </ul>
<ul style="list-style-type: none"> <li>Analog to digital converter (ADC)—Up to 16-channel, 10-bit resolution</li> </ul>	<ul style="list-style-type: none"> <li>Provides fast and easy conversion of analog inputs</li> <li>2.5µs conversion time, automatic compare function, temperature sensor</li> </ul>
<ul style="list-style-type: none"> <li>Serial communications interface (SCI) —with LIN 2.0 Protocol and SAE J2602 compliance; Master extended break generation; Slave extended break detection; LIN slave supplement on SCI1; Automatic baud rate correction; Message time-out detection</li> </ul>	<ul style="list-style-type: none"> <li>Enables standard or LIN UART-based communication. Offers additional support for lower power using Wake from STOP feature</li> </ul>
<ul style="list-style-type: none"> <li>RTC—(Real-time counter) 8-bit modulus counter with binary or decimal based prescaler; External clock source for precise time base, time-of-day calendar or task scheduling functions; Free running on-chip low power oscillator (1 kHz) for cyclic wake-up wit</li> </ul>	<ul style="list-style-type: none"> <li>Improved task scheduling for applications requiring Time of Day calendar functions, frees up timers for other activities</li> </ul>
<b>Input/Output</b>	
<ul style="list-style-type: none"> <li>16 interrupt pins with selectable polarity</li> </ul>	<ul style="list-style-type: none"> <li>Offers flexibility by interfacing to a large number of pins that are capable of generating interrupts</li> </ul>
<ul style="list-style-type: none"> <li>22 general purpose input/output (GPIO)s</li> </ul>	<ul style="list-style-type: none"> <li>Results in a large number of flexible I/O pins</li> </ul>
<b>System Protection</b>	
<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>Built in system protection to help secure data and warn of possible voltage loss conditions</li> </ul>
<ul style="list-style-type: none"> <li>Flash block protection</li> <li>EEPROM block protection</li> </ul>	<ul style="list-style-type: none"> <li>Helps provide security by protecting code from unauthorized reading and guards against unintentional write/erase of user-code/data</li> </ul>
<b>Hardware Development Support</b>	
<ul style="list-style-type: none"> <li>Single-wire background debug interface</li> </ul>	<ul style="list-style-type: none"> <li>This allows the developers to use the same interface for multiple platforms</li> </ul>
<ul style="list-style-type: none"> <li>On-chip in-circuit emulator (ICE) debug with real time bus capture</li> </ul>	<ul style="list-style-type: none"> <li>Grants full access to built-in chip emulation without the added expense of traditional emulator hardware</li> <li>Reduces development time as emulation can be done real-time and on-chip</li> </ul>

## Cost-Effective Development Tools

### DEMO9S08EL32 MSRP \$69

Cost-effective demonstration board, provides USB to BDM interface, LIN PHY, RS232 interface, Push buttons, LEDs, LIN and USB cables

### CodeWarrior® Development Studio for Microcontrollers 6.x CWX-HXX-SE Complimentary\*

CodeWarrior Development Studio for Microcontrollers is an integrated tool suite that supports software development for Freescale's microcontrollers. Designers can further accelerate application development with the help of the Processor Expert™ tool, which is an award-winning rapid application development tool in the CodeWarrior tool suite.

\* Subject to license agreement

Part Number	Temp Ranges	Package
MC9S08EL32CTL	-40°C to +85°C	28 TSSOP
MC9S08EL32CTJ	-40°C to +85°C	20 TSSOP
MC9S08EL16CTL	-40°C to +85°C	28 TSSOP
MC9S08EL16CTJ	-40°C to +85°C	20 TSSOP
MC9S08SL16CTL	-40°C to +85°C	28 TSSOP
MC9S08SL16CTJ	-40°C to +85°C	20 TSSOP
MC9S08SL8CTL	-40°C to +85°C	28 TSSOP
MC9S08SL8CTJ	-40°C to +85°C	20 TSSOP

## Learn More:

For more information about the EL/SL family, please visit [www.freescale.com/8bit](http://www.freescale.com/8bit).