



Taking the Lead in
Low Power

Ultra-Low-Power S08QL MCU Family

As the lowest power S08 devices, the S08QL MCU family offers optimized performance for ultra-low-power, with increased battery life, reduced cost, and future proofed design.

OVERVIEW

The S08QL MCU family provides extreme energy efficiency at a voltage range of 1.8 to 3.6V, perfect for cost-effective, battery sensitive, portable, low-power applications.

The S08QL family offers low-power features such as two ultra-low-power stop modes, low-power run and wait modes, 6 μ s wake-up time, ultra-low-power external oscillator and clock gating registers to disable clocks to unused peripherals.

In addition to low-power, the S08QL MCU family supports up to 8 KB of flash memory. It consists of an 8-bit modulo timer, a 16-bit timer/PWM (TPM), UART, RTC, 12-bit ADC and analog comparator. This family can be powered down to 1.8V and still able to operate at maximum 20 MHz CPU speed.

TARGET APPLICATIONS

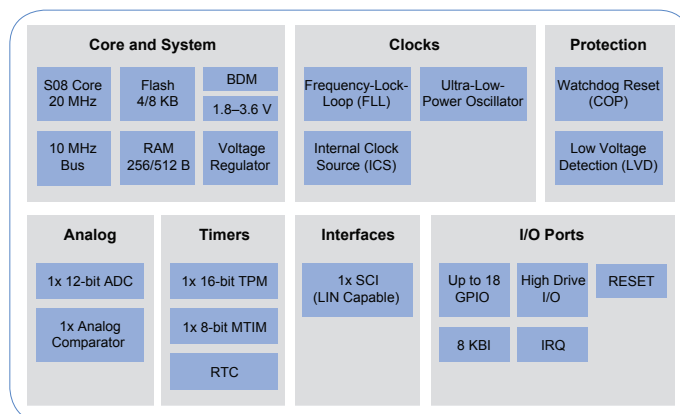
- ▶ Battery-powered applications
- ▶ Residential/commercial garage door openers
- ▶ Smoke detectors
- ▶ Remote window shutters
- ▶ Remote control applications
- ▶ Battery-operated toys and games

SOFTWARE DEVELOPMENT TOOLS

CodeWarrior Development Studio V11.x

CodeWarrior Development Studio for Microcontrollers is a suite of tools that supports software development for S08, and DSC families. To learn more, please visit nxp.com/CodeWarrior.

S08QL MCU FAMILY BLOCK DIAGRAM



S08QL MCU FAMILY FEATURES AND BENEFITS

Features	Benefits
Power-Saving Features	
- Two ultra-low-power stop modes, one of which allows limited use of peripherals - Low-power run and wait modes 6 μs typical wake up time from stop mode	- Allows continued application sampling in a reduced power state which extends battery life - Allows use of all chip peripherals in a low-power state - Enables faster execution out of stop modes
- 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	- Provides choice of frequencies on the fly. Reducing frequency saves current. - Includes ultra-low-power OSC for accurate timebase in low-power modes
Clock gating disables clocks to unused peripherals	- Provides flexibility to turn off individual modules - Reduces power consumption
8-bit HCS08 Central Processing Unit (CPU)	
- Up to 20 MHz HCS08 CPU from 1.8V to 3.6V and across temperature range of -40°C to +85°C - Provides bus speed operation of 10 MHz from 1.8V to 3.6V	Offers high performance, even at low voltage levels for battery-operated applications
Peripherals	
ADC—8-channel, 12-bit resolution; 2.5 μs conversion; automatic compare function; internal temperature sensor; internal bandgap reference channel; operation in low-power stop mode	- Allows up to 8 external ADC channels to be sampled at extremely high speeds - Accuracy and full functionality guaranteed across 1.8V to 3.6V operating voltage of the MCU
Timer/pulse-width modulator (TPM)—one channel with 16-bit counter, selectable input capture, output compare, or buffered edge- or center-aligned PWM	16-bit base free running counter allow higher resolution for input capture results and longer TPM period comparing to the conventional 8-bit base counter
Serial communications interface (SCI)—module offering asynchronous communications, 13-bit break option, flexible baud rate generator, double buffered transmit and receive and optional H/W parity checking and generation	- 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
Analog comparator (ACMP) with option to compare to an internal reference voltage. Output can be optionally routed to TPM as input capture trigger	- 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
8-bit module timer module with 8-bit prescaler (MTIM)	A timer overflow interrupt can be enabled to generate periodic interrupts for time-based software loops
Input/Output	
Up to 18 general purpose input/output (GPIO), one input-only and one output-only pin	Results in large number of flexible I/O pins that allow developers to easily interface device into their own designs
8 keyboard interrupts (KBI) pins with selectable polarity	Can be used for reading input from a keypad or used as general pin interrupts

S08QL MCU FAMILY PACKAGE OPTIONS

Part Number	Temp. Range	Package
MC9S08QL8CTJ	-40 to +85 °C	20-pin TSSOP
MC9S08QL8CTG	-40 to +85 °C	16-pin TSSOP
MC9S08QL4CTJ	-40 to +85 °C	20-pin TSSOP
MC9S08QL4CTG	-40 to +85 °C	16-pin TSSOP

www.nxp.com/S08QL

NXP and the NXP logo are trademarks of NXP B.V. All other product or service names are the property of their respective owners. Arm, Cortex, and Keil are registered trademarks of Arm Limited (or its subsidiaries) in the EU and/or elsewhere. All rights reserved. © 2018 NXP B.V.

Document Number: S08QLMCUFS REV 0
Date of release: July 2018