Document Number: MC9S08PL60PB
Rev. 1, 9/2011

MC9S08PL60 Series Family Product Brief

1 Application examples

These are general-purpose devices suitable for a wide range of applications:

- Handheld devices
- Sensing systems
- Human input devices
- Large appliances
- Industrial control
- Small appliances
- Key pads
- Power tools
- Personal care appliance
- Electric Motor
- Remote control
- Low-end meter
- UPS
- Battery chargers
- HVAC
- Smart circuit breakers

Contents

1 Application examples....1
2 Features....2
2.1 Introduction....2
2.2 MCU block diagram....3
2.3 Device pin assignment....5
2.4 Module-by-module features....8
3 Development support....10
4 Revision history....10

© 2011 Freescale Semiconductor, Inc.

2 Features

2.1 Introduction

These device series are members of the low-cost, high-performance HCS08 family of 8-bit microcontroller units (MCUs). All MCUs in the family use the enhanced HCS08 central processor unit and are available with a variety of modules, memory sizes and types, and package types. The following table summarizes the peripheral availability per package type for the devices available.

Table 1. Memory and package availability

Feature	MC9S08PL60	MC9S08PL32
Flash size (bytes)	60,864	32,768
EEPROM size (bytes)	256	256
RAM size (bytes)	4,096	4,096
LQFP-64	Yes	Yes
QFP-64	Yes	Yes
LQFP-48	Yes	Yes
QFN-48	Yes	Yes
LQFP-44	Yes	Yes
LQFP-32	Yes	Yes

Table 2. Feature availability

Pin number	64-pin	48-pin	44-pin	32-pin
Bus frequency (MHz)	10	10	10	10
IRQ	Yes			
WDOG	Yes			
DBG	Yes			
IPC	Yes			
ICS	Yes			
XOSC	Yes			
RTC	Yes			
FTM0 channels	2-ch	2-ch	2-ch	2-ch
FTM1 channels	2-ch	2-ch	2-ch	2-ch
FTM2 channels	6-ch	6-ch	6-ch	6-ch
MTIM0	Yes			
MTIM1	Yes			

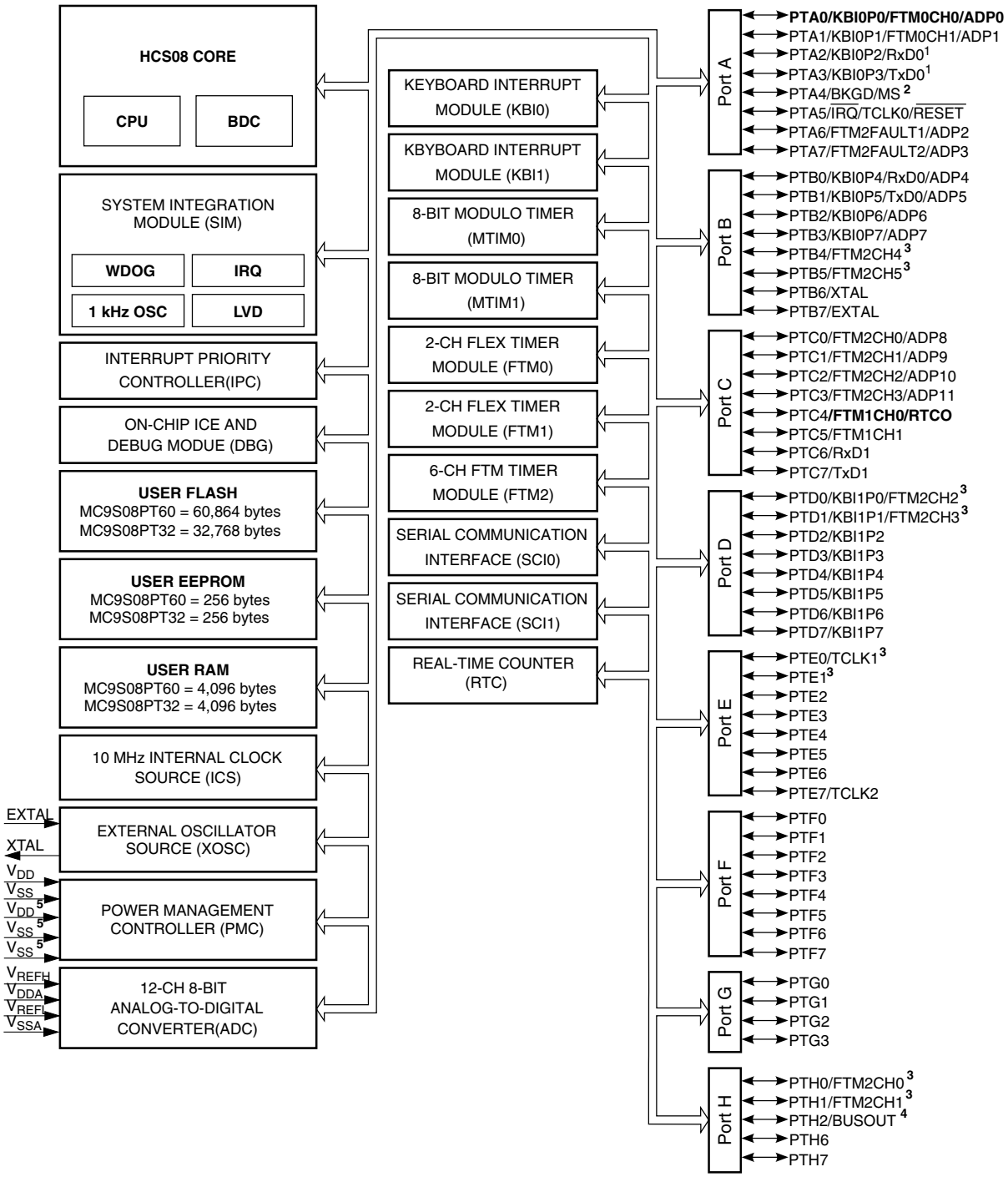
Table continues on the next page...

Table 2. Feature availability (continued)

Pin number	64-pin	48-pin	44-pin	32-pin
SCI0	Yes			
SCI1	Yes			
ADC channels	12	12	12	12
KBI pins	16	16	12	12
GPIO	57	41	37	30

2.2 MCU block diagram

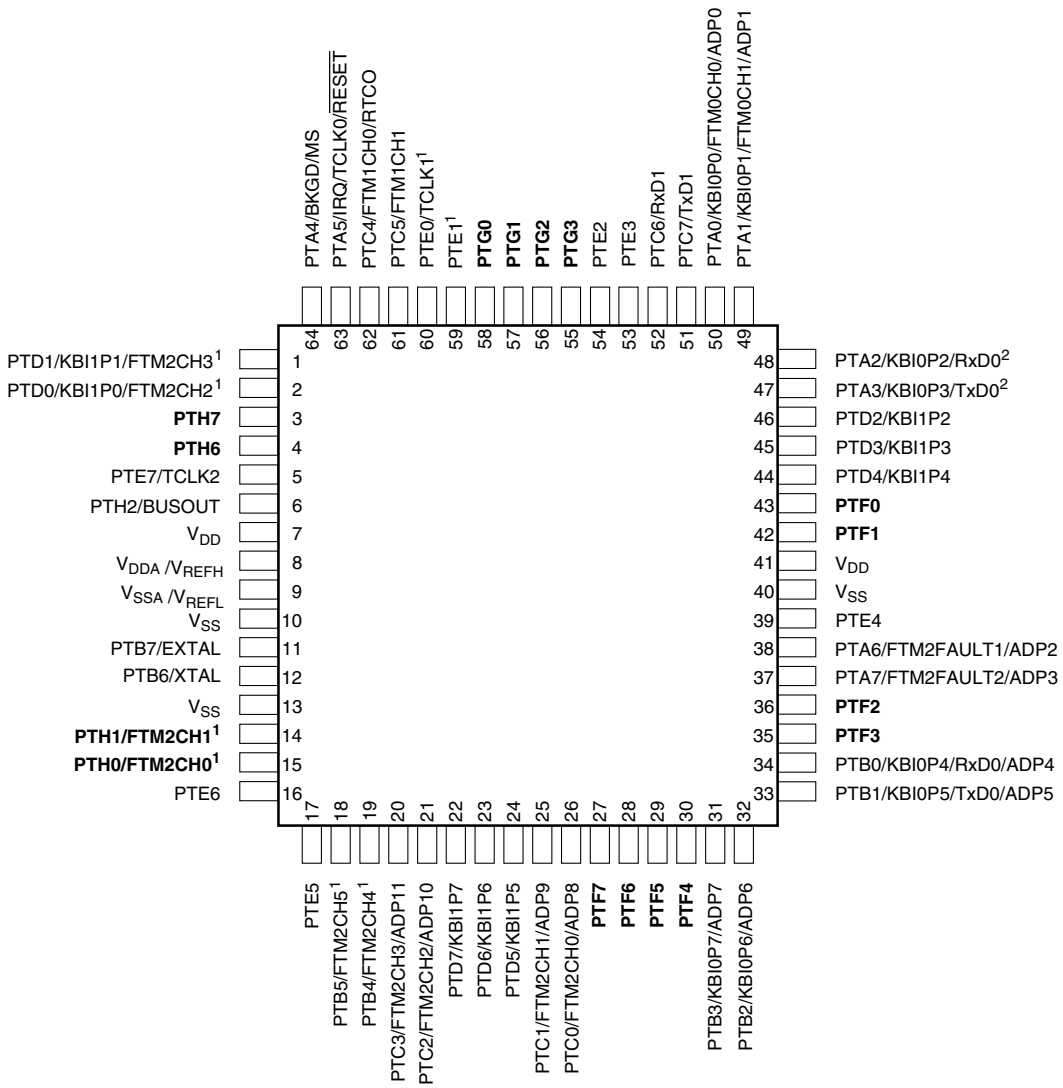
The block diagram in the following figure shows the structure of the MCUs.



1. **PTA2 and PTA3 operate as true open drain when working as output.**
2. **PTA4/BKGD/MS is an output-only pin when used as port pin.**
3. **PTB4, PTB5, PTD0, PTD1, PTE0, PTE1, PTH0, and PTH1 can provide ultra-high source/sink current up to 20 mA.**
4. **The frequency of the clock from BUSOUT must be equal or less than 10 MHz with 25 pF loading at PAD.**
5. **The secondary power pair of V_{DD} and V_{SS} (pin 41 and pin 40 in 64-pin packages) and the third V_{SS} (pin 13 in 64-pin packages) are not bonded** in 32-pin packages.

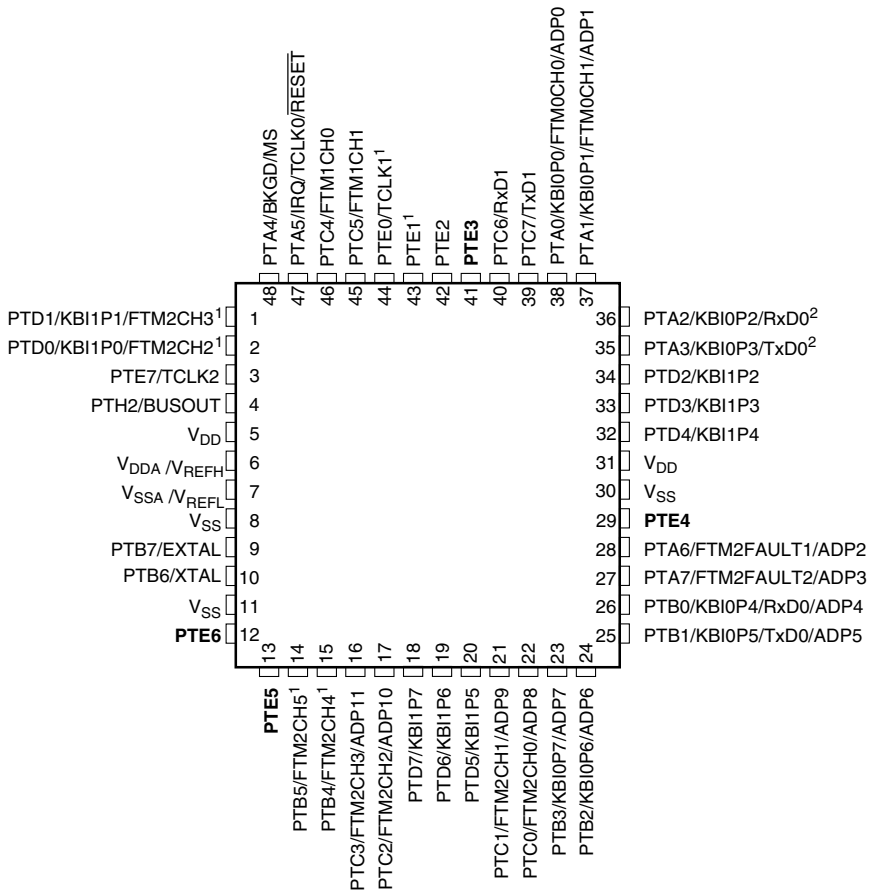
Figure 1. MCU block diagram

2.3 Device pin assignment



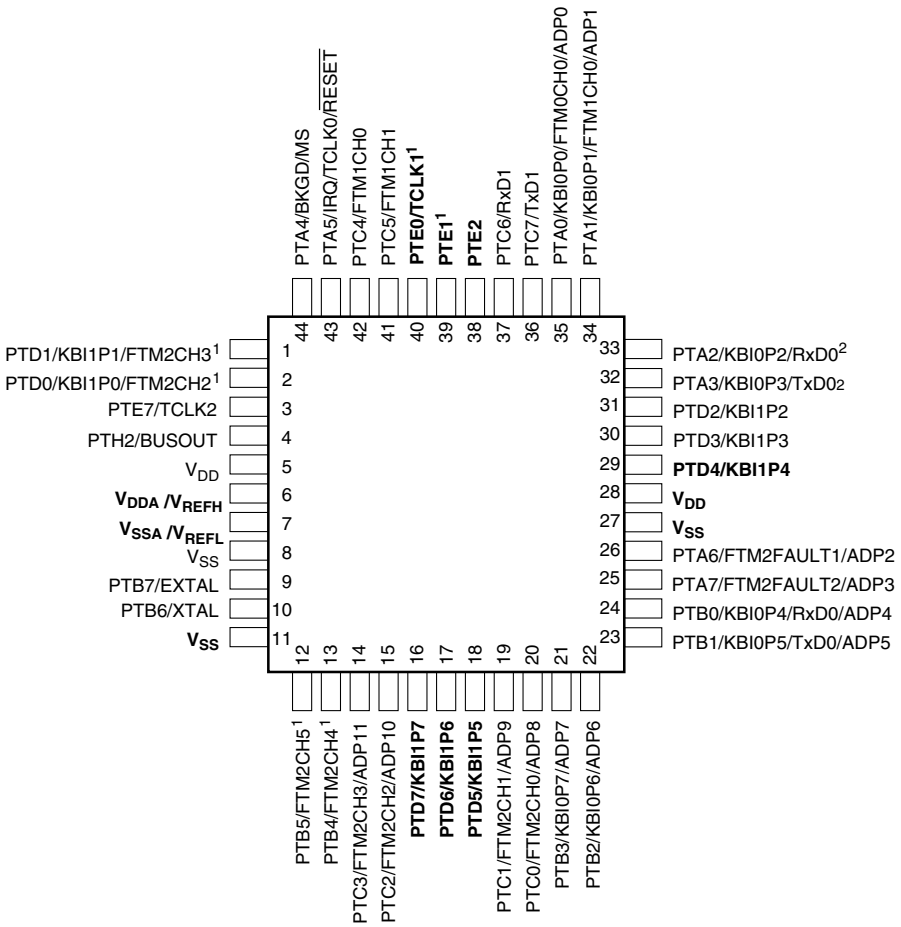
Pins in **bold** are not available on less pin-count packages.
1. High source/sink current pins
2. True open drain pins

Figure 2. MC9S08PL60 64-pin QFP and LQFP packages



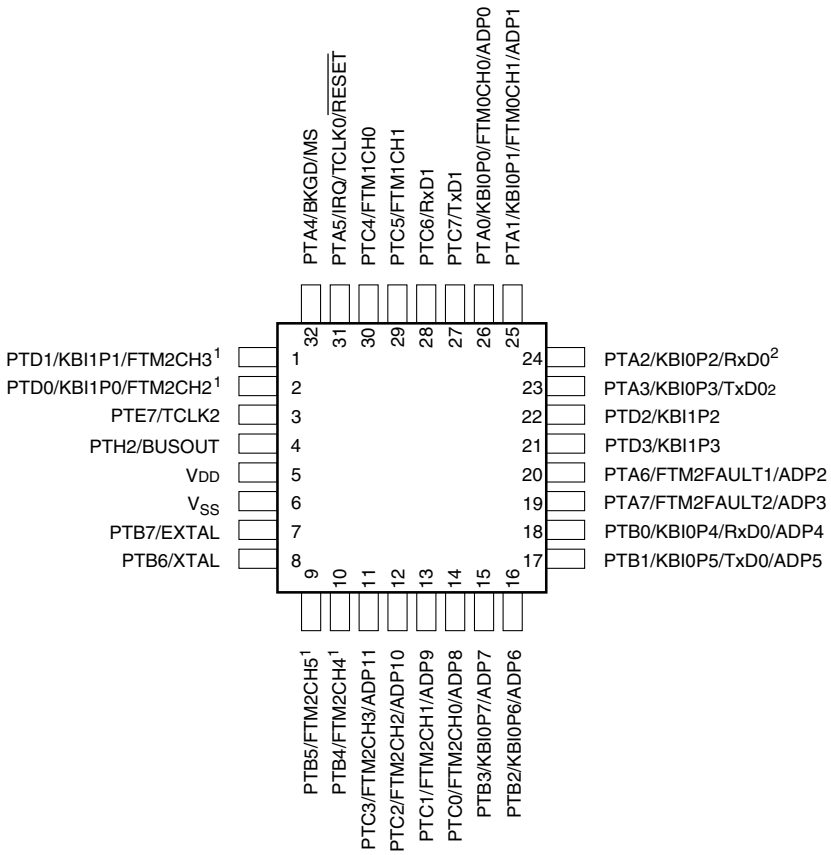
Pins in **bold** are not available on less pin-count packages.
1. High source/sink current pins
2. True open drain pins

Figure 3. MC9S08PL60 48-pin QFN and LQFP packages



Pins in **bold** are not available on less pin-count packages.
1. High source/sink current pins
2. True open drain pins

Figure 4. MC9S08PL60 44-pin LQFP package



1. High source/sink current pins
2. True open drain pins

Figure 5. MC9S08PL60 32-pin LQFP package

2.4 Module-by-module features

2.4.1 8-Bit HCS08 central processor unit (CPU)

- Up to 10 MHz bus at 4.5 V to 5.5 V across temperature range of -40 °C to 85 °C
- Support for up to 48 interrupt/reset sources
- Support up to four-level nested interrupt
- On-chip memory
- Up to 60 KB flash read/program/erase over full operating voltage and temperature
- Up to 256 Byte EEPROM; 2-byte erase sector; program and erase while executing flash
- 48-bit universally unique identification (UUID) to identify each device
- 4096-byte random-access memory (RAM)
- Flash and RAM access protection

2.4.2 Power-saving modes

- One low-power stop modes; reduced power wait mode
- Peripheral clock enable register can disable clocks to unused modules, reducing currents; allows clocks to remain enabled to specific peripherals in stop3 mode

2.4.3 Clocks

- Oscillator (XOSC)
  - Loop-controlled Pierce oscillator
  - Crystal or ceramic resonator range of 31.25 kHz to 39.0625 kHz or 4 MHz to 10 MHz
- Internal clock source (ICS)
  - Internal clock source module containing a frequency-locked-loop (FLL) controlled by internal or external reference
  - Precision trimming of internal reference allowing 0.2% resolution
  - 1% deviation across temperature range of 0 °C to 70 °C and 1.5% deviation across temperature range of -40 °C to 85 °C
  - Up to 10 MHz

2.4.4 System protection

- Window watchdog with independent clock source
- Low-voltage detection with reset or interrupt; selectable trip points
- Illegal Opcode Detection with reset
- Illegal address Detection with reset
- Programmable cyclic redundancy check

2.4.5 ADC

- 12-channel, 8-bit resolution; 2.5 µs conversion time
- Data buffers with optional watermark
- Automatic compare function
- 1.7 mV/°C temperature sensor
- Internal bandgap reference channel
- Operation in stop
- Optional hardware trigger

2.4.6 FTM

- Three flex timer modulators (FTM) modules including one 6-channel and two 2-channel ones
- 16-bit counter; each channel can be configured for input capture
- Output compare
- Edge- or center-aligned PWM mode

2.4.7 MTIM

Two modulo timers with 8-bit prescaler and overflow interrupt

2.4.8 RTC

16-bit real timer counter.

2.4.9 SCI

- Two serial communications interface (SCI/ UART) modules optional 13-bit break
- Full duplex non-return to zero (NRZ)
- LIN extension support

3 Development support

- Single-wire background debug interface
- Breakpoint capability to allow three breakpoint setting during in-circuit debugging
- On-chip in-circuit emulator (ICE) debug module containing two comparators and nine trigger modes

4 Revision history

The following table provides a revision history for this document.

Table 3. Revision history

Rev. No.	Date	Substantial Changes
0	8/29/2011	Initial published
1	9/19/2011	Updated block diagram figure, feature availability table, CPU feature, and system protection sections.

How to Reach Us:

Home Page:
www.freescale.com

Web Support:
http://www.freescale.com/support

USA/Europe or Locations Not Listed:
Freescale Semiconductor
Technical Information Center, EL516
2100 East Elliot Road
Tempe, Arizona 85284
+1-800-521-6274 or +1-480-768-2130
www.freescale.com/support

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
www.freescale.com/support

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor China Ltd.
Exchange Building 23F
No. 118 Jianguo Road
Chaoyang District
Beijing 100022
China
+86 10 5879 8000
support.asia@freescale.com

For Literature Requests Only:
Freescale Semiconductor Literature Distribution Center
1-800-441-2447 or +1-303-675-2140
Fax: +1-303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

Information in this document is provided solely to enable system and software implementers to use Freescale Semiconductors products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document.

Freescale Semiconductor reserves the right to make changes without further notice to any products herein. Freescale Semiconductor makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any liability, including without limitation consequential or incidental damages. "Typical" parameters that may be provided in Freescale Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals", must be validated for each customer application by customer's technical experts. Freescale Semiconductor does not convey any license under its patent rights nor the rights of others. Freescale Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which failure of the Freescale Semiconductor product could create a situation where personal injury or death may occur. Should Buyer purchase or use Freescale Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify Freescale Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claims alleges that Freescale Semiconductor was negligent regarding the design or manufacture of the part.

RoHS-compliant and/or Pb-free versions of Freescale products have the functionality and electrical characteristics as their non-RoHS-complaint and/or non-Pb-free counterparts. For further information, see http://www.freescale.com or contact your Freescale sales representative.

For information on Freescale's Environmental Products program, go to http://www.freescale.com/epp.

Freescale™ and the Freescale logo are trademarks of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners.

© 2011 Freescale Semiconductor, Inc.

Document Number: MC9S08PL60PB
Rev. 1, 9/2011

freescale semiconductor