Freescale Semiconductor, Inc.

NXP

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A FLASH MCU SOLUTION

68HC908SR12
8-bit Microcontroller

TARGET APPLICATIONS

- Smart batteries
- Battery chargers
- Instrumentation
- Data acquisition
- Temperature sensing and control

The 68HC908SR12 features advanced analog integration with on-chip temperature sensor, current sensor, 10-bit analog-to-digital converter (ADC) and programmable amplifier. Other valuable peripherals include SMBus, pulse width modulator (PWM), clock generator module with PLL (CGM), I²C and timebase module (TBM).
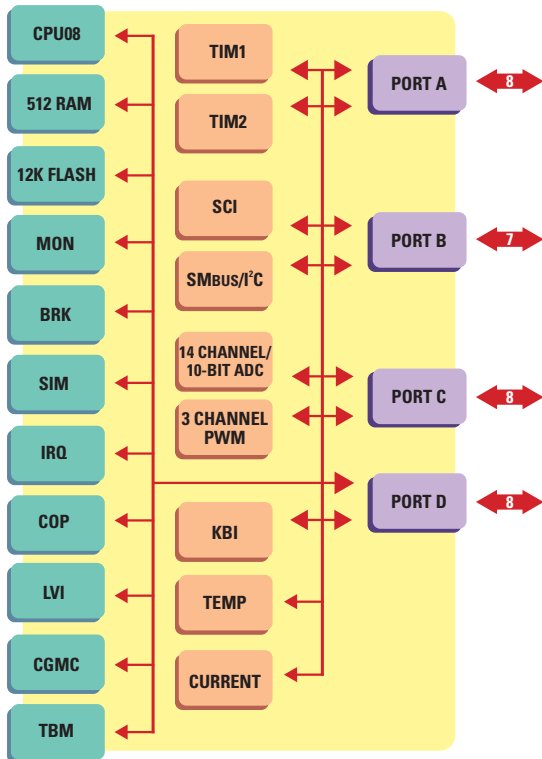
FEATURES	BENEFITS

HIGH-PERFORMANCE 68HC08 CPU CORE

- 8 MHz bus operation at 5V operation for 125 nsec minimum instruction cycle time
- 4 MHz bus operation at 3V for 250 nsec minimum instruction cycle time
- Efficient instruction set including multiply and divide
- 16 flexible addressing modes including stack relative with 16-bit stack pointer
- Fully static low-voltage, low-power design with wait and stop modes

- Object code compatible with the 68HC05
- Easy to learn and use architecture
- C optimized architecture provides compact code

INTEGRATED SECOND GENERATION FLASH MEMORY

- In-application re-programmable
- Extremely fast programming, encoding 64 bytes in as fast as 2 msec
- FLASH programming across the 68HC08's full operating supply voltage with no extra programming voltage
- 10K write/erase cycles minimum over temperature
- Flexible block protection and security

- Cost-effective programming changes and field software upgrades via in-application programmability and re-programmability
- Reduces production programming costs through ultra-fast programming
- Allows re-programmable battery-powered applications
- Byte-writable for data as well as program memory
- Protects code from unauthorized reading and to guard against unintentional erasing/writing of user-programmable segments of code

ADVANCED ANALOG FUNCTIONS

- Temperature sensor
- Current sensor
- Programmable amplifier

- Provides cost savings by moving functions on-chip
- Better than 1°C resolution, range –20°C to +70°C
- Amplifier gain up to 16x reduces the need for external op-amps
- Generates an interrupt when current is detected to conserve power

10-BIT ANALOG-TO-DIGITAL CONVERTER

- 14 channels (11 for the 42-pin package)
- Single conversion in 8 µsec

- Fast, easy conversion from analog inputs like temperature, pressure and fluid levels to digital values for CPU processing

CLOCK GENERATION MODULE WITH PLL

- Programmable clock frequency in integer multiples of external crystal reference
- Crystal reference of 32 kHz to 100 kHz
- External clock option with or without PLL

- Provides high performance using low-cost, low-frequency reference crystals
- Reduces generated noise while still providing high performance (up to 32 MHz internal clock)
- Fast, easy conversion from analog inputs like temperature, pressure and fluid levels to digital values for CPU processing

8-BIT PULSE-WIDTH MODULATION

- 3 independent PWM signals
- Automatic phase control
- 125 nsec resolution at 8 MHz bus

- Provides multiple motor or multi-phase control capability
- Precise phase difference between PWM output signals

MCU SOLUTION

68HC908SR12

PART NUMBER	DESCRIPTION	RESALE*
EASY-TO-ORDER DEVELOPMENT TOOL KITS		
M68ICS08SR	68HC908SR12 Programmer/ in-circuit debug kit	$295
KITMMEVS08SR12	Cost-effective real-time in-circuit emulator kit	$1450
KITMMDS08SR12	High-performance real-time in-circuit emulator kit	$3950
INDIVIDUAL DEVELOPMENT TOOL COMPONENTS		
M68MMDS0508	High-performance emulator	$2950
M68MMPFB0508	MMEVS platform board	$395
M68EML08SR12	Emulation module daughter board	$495
M68CBL05B	Low-noise flex cable	$120
M68CBL05C	Low-noise flex cable	$120
M68TB08SR12B42	42-pin SDIP target head adapter	$175
M68TC08SR12FA48	48-pin LQFP target head adapter	$300
M68TQS048SDG1	48-pin TQ socket with guides	$50
M68TQP048SD1	48-pin TQPACK	$60

APPLICATION NOTES

- AN2093/D Creating Efficient Code for the MC68HC08
- AN1752/D Data Structures for 8-bit MCUs
- AN1705/D Noise Reduction Techniques for MCU-Based Systems
- AN1219/D M68HC08 Integer Math Routines
- AN1218/D HC05 to HC08 Optimization
- AN1837/D Non-Volatile Memory Technology Review
- AN1259/D System Design and Layout Techniques for Noise Reduction in MCU-Based Systems
- AN1263/D Designing for Electromagnetic Compatibility with Single-Chip Microcontrollers
- AN1050/D Designing for Electromagnetic Compatibility (EMC) with HCMOS Microcontrollers
- AN1705/D Noise Reduction Techniques for Microcontroller-Based Systems

And many more—see our Web site at http://www.motorola.com/mcu

FEATURES	BENEFITS

FOUR PROGRAMMABLE 16-BIT TIMER CHANNELS

- 125 nsec resolution at 8 MHz bus
- External clock input pin
- Free-running counter or modulo up-counter

- Provides input capture, output compare or unbuffered PWM
- Pairing timer channels provides a buffered PWM function

TIMEBASE MODULE

- 8 user-selectable periodic real-time interrupts
- Optionally operate in low-power stop mode

- Provides auto wakeup from low-power stop mode to maintain real-time clock or check external device status such as sensors

MULTI-MASTER I²C BUS

- SMBus (System Management Bus) version 1.0/1.1 compatible

SERIAL COMMUNICATIONS INTERFACE

- UART asynchronous communications system
- Flexible baud rate generator
- Double buffered transmit and receive
- Optional hardware parity checking and generation

- Asynchronous communication between the MCU and a terminal, computer or a network of microcontrollers

SERIAL PERIPHERAL INTERFACE

- Full-duplex 3-wire synchronous transfers
- Maximum master bit rate of 4 MHz for 8 MHz system clock

- High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals
- Cost-effective serial peripheral expansion to EEPROM, high-precision A/D and D/A converters, real-time clocks, etc.

COMPUTER OPERATING PROPERLY WATCHDOG TIMER

- Provides system protection in the event of runaway code by resetting the MCU to a known state

LOW-VOLTAGE INHIBIT

- Improves reliability by resetting the MCU when voltage drops below trip point
- Integration reduces system cost

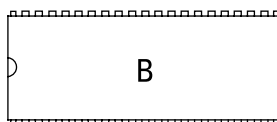### UP TO 31 BIDIRECTIONAL INPUT/OUTPUT (I/O) LINES

- Keyboard scan with selectable interrupts on eight I/O pins
- Software programmable pullups on eight pins

- Keyboard scan with programmable pullups eliminates external glue logic when interfacing to simple keypads

PACKAGE OPTIONS

PART NUMBER	PACKAGE	TEMPERATURE RANGE
MC68HC908SR12CB	42 SDIP	-40 to 85ºC
MC68HC908SR12MB	42 SDIP	-40 to 125ºC
MC68HC908SR12CFA	48 LQFP	-40 to 85ºC
MC68HC908SR12MFA	48 LQFP	-40 to 125ºC
SAMPLE PACKS	**PACKAGE**	**TEMPERATURE RANGE**
KMC908SR12CB	42 SDIP	-40 to 85ºC
KMC908SR12MB	42 SDIP	-40 to 125ºC
KMC908SR12CFA	48 LQFP	-40 to 85ºC
KMC908SR12MFA	48 LQFP	-40 to 125ºC

42-Pin Plastic SDIP

B

48-Lead QFP

FA

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* All prices are manufacturer's suggested resale for North America.

68HC908SR12P2/D
Rev. 1