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MOTOROLA
intelligence everywhere™

digital dna™

A FLASH MCU SOLUTION

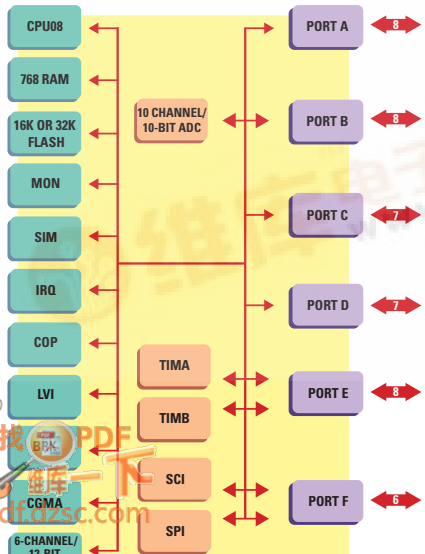
68HC908MR32/MR16

8-bit Microcontroller

TARGET APPLICATIONS

- Appliance compressors
- Smart appliances
- Industrial compressors (HVAC)
- Variable speed pumps (well, gas)
- HVAC blowers and fans
- General purpose drives
- Exercise equipment
- Electric powered recreational vehicles
- Medical scanners/pumps
- Printers/scanners/fax
- Electric lawn equipment
- Throttle control
- Seat module control
- Uninterruptable power supplies

Higher performance, advanced integration and reduced system costs are among the benefits generated by the 68HC908MR32 and the 68HC908MR16, Motorola's highly integrated 8-bit FLASH microcontrollers designed for enhanced electronic motion control. Engineered for applications as varied as smart appliances, automotive subsystems, industrial controls and uninterruptable power supplies, the 68HC908MR32 and the 68HC908MR16 include a 6-channel, 12-bit pulse-width modulator (PWMMC) for a comprehensive AC motor timer solution supporting both center and edge-aligned modes with automatic dead-time insertion and patented dead-time compensation capability. This leading-edge technology promotes versatility while lowering costs with greater flexibility allowing configuration for several drive topographies in various motor types.



FEATURES	BENEFITS
HIGH-PERFORMANCE 68HC08 CPU CORE	
• 8 MHz bus operation at 5V operation for 125 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 • 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
10-BIT ANALOG-TO-DIGITAL CONVERTER	
• 10 channels • Single conversion in 17 µsec	• Provides single or continuous conversion • Generates an interrupt when input signal exceeds a software programmable limit
12-BIT PULSE-WIDTH MODULATION FOR MOTOR CONTROL	
• 3 complementary or 6 independent PWM signals • Programmable output polarity • Edge- or center-aligned waveforms • Automatic dead time generation/compensation • 20 mA sink on all PWMMC pins • Programmable fault detection	• Provides multiple motor or multi-phase control capability • Reduces system cost through integration of digital/analog circuitry • Includes patented distortion correction circuitry that dramatically reduces system-noise and improves efficiency of the drive without the need for external current sensors • Allows direct drive of the opto-coupling stage • Guarantees immediate shutdown of the PWM outputs ensuring motor and consumer safety
CLOCK GENERATION MODULE WITH PLL	
• Programmable clock frequency in integer multiples of external crystal references • Crystal reference of 1 MHz to 8 MHz • 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)

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A FLASH MCU SOLUTION

68HC908MR32/MR16

PART NUMBER	DESCRIPTION	RESALE*
EASY-TO-ORDER DEVELOPMENT TOOL KITS		
M68ICS08MR	68HC908MRxx programmer/ in-circuit debug kit	$295
KITMMEVS08MR32	Cost-effective real-time in-circuit emulator kit	$1450
KITMMDS08MR32	High-performance real-time in-circuit emulator kit	$3950
INDIVIDUAL DEVELOPMENT TOOL COMPONENTS		
M68MMDS08508	High-performance emulator	$2950
M68MMPFB0508	MMEVS platform board	$395
M68EM08MR32	Emulation module daughter board	$495
M68CBL05C	Low-noise flex cable	$120
M68TC08MR24B56	56-pin SDIP target head adapter	$250
M68TC08MR24FU64	64-pin QFP target head adapter	$250
M68TQS064SAG1	64-pin TQ socket with guides	$50
M68TQP064SAM01	64-pin TQPACK	$70

ENGINEERING BULLETINS AND APPLICATION NOTES

- AN1857/D A 3-Phase AC Induction Motor Control System
- AN1218/D HC05 to HC08 Optimization
- AN1844 Using 68HC908MR32 in Place of MC68HC908MR24
- AN1837/D Non-Volatile Memory Technology Review
- AN2093/D Creating Efficient C Code for the MC68HC08
- AN1752/D Data Structures for 8-bit MCUs
- AN1219/D M68HC08 Integer Math Routines
- AN1705/D Noise Reduction Techniques for MCU-Based Systems
- AN1259: System Design and Layout Techniques for Noise Reduction in MCU-Based Systems
- AN1263: Designing for Electromagnetic Compatibility with Single-Chip Microcontrollers
- AN1050: Designing for Electromagnetic Compatibility (EMC) with HCMOS Microcontrollers
- AN1705: Noise Reduction Techniques for Microcontroller-Based Systems

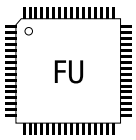
And many more—see our Web site at http://www.motorola.com/mcu

FEATURES	BENEFITS
SIX 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
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
UP TO 37 BIDIRECTIONAL INPUT/OUTPUT (I/O) LINES	
• 10 mA sink/source capability on all I/O pins • 15 mA sink capability on eight I/O pins • Keyboard scan with selectable interrupts on five I/O pins • Software programmable pullups on I/O pins	• High-current I/O allows direct drive of LED and other circuits to eliminate external drivers and reduce systems costs • Keyboard scan with programmable pullups eliminates external glue logic when interfacing to simple keypads

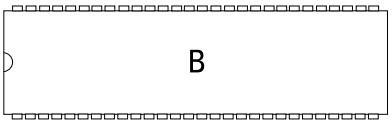
PACKAGE OPTIONS

PART NUMBER	PACKAGE	TEMPERATURE RANGE
MC68HC908MR32CFU	64 QFP	-40 to 85°C
MC68HC908MR32VFU	64 QFP	-40 to 125°C
MC68HC908MR32CB	56 SDIP	-40 to 85°C
MC68HC908MR32VB	56 SDIP	-40 to 125°C
MC68HC908MR16CFU	64 QFP	-40 to 85°C
MC68HC908MR16VFU	64 QFP	-40 to 125°C
MC68HC908MR16CB	56 SDIP	-40 to 85°C
MC68HC908MR16VB	56 SDIP	-40 to 125°C
SAMPLE PACKS	**PACKAGE**	**TEMPERATURE RANGE**
KMC908MR32VFU	64 QFP	-40 to 105°C
KMC908MR32VB	56 SDIP	-40 to 105°C
KMC908MR16VFU	64 QFP	-40 to 105°C
KMC908MR16VB	56 SDIP	-40 to 105°C

64-Lead QFP



56-Pin Plastic SDIP



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