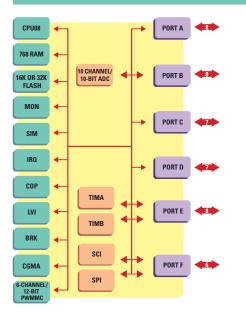
# A FLASH MCU SOLUTION

# 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.



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digitaldna

# FEATURES

### 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

**BENEFITS** 

- · Easy to learn and use architecture
- C optimized architecture provides compact code

· Cost-effective programming changes and

field software upgrades via in-application

programmability and re-programmability

• Reduces production programming costs

Byte-writable for data as well as program

· Protects code from unauthorized reading

erasing/writing of user-programmable

and to quard against unintentional

through ultra-fast programming

memory

segments of 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
- **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)

# A FLASH MCU SOLUTION

# 68HC908MR32/MR16

### PART NUMBER | DESCRIPTION | RESALE\* EASY-TO-ORDER DEVELOPMENT TOOL KITS

| M68ICS08MR                             | 68HC908MRxx programmer/<br>in-circuit debug kit       | \$295  |  |
|--|---|--------|--|
| KITMMEVS08MR32                         | Cost-effective real-time<br>in-circuit emulator kit   | \$1450 |  |
| KITMMDS08MR32                          | High-performance real-time<br>in-circuit emulator kit | \$3950 |  |
| INDIVIDUAL DEVELOPMENT TOOL COMPONENTS |   |        |  |

#### \$2950 M68MMDS08508 High-performance emulator M68MMPFB0508 MMEVS platform board \$395 M68EM08MR32 Emulation module daughter \$495 board M68CBL05C Low-noise flex cable \$120 M68TC08MR24B56 56-pin SDIP target head adapter \$250 M68TC08MR24FU64 64-pin QFP target head adapter \$250 64-pin TQ socket with guides M68TQS064SAG1 \$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
- AN1752/D Data Structures for 8-bit MCUs
- AN1219/D M68HC08 Integer Math Routines
- AN1259: System Design and Layout Techniques for Noise
- Reduction in MCU-Based Systems AN1263: Designing for Electromagnetic Compatibility with
- Single-Chip Microcontrollers
- Microcontroller-Based Systems

And many more-see our Web site at

# **FEATURES**

# SIX PROGRAMMABLE 16-BIT TIMER CHANNELS

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

# SERIAL COMMUNICATIONS INTERFACE

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

# SERIAL PERIPHERAL INTERFACE

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

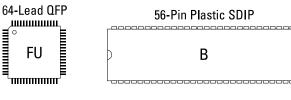
# **UP TO 37 BIDIRECTIONAL INPUT/OUTPUT (I/O) LINES**

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

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





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68HC908MR32PB/D Rev. 1

**BENEFITS** 

· Provides input capture, output compare

Pairing timer channels provides a

or unbuffered PWM

buffered PWM function

· Asynchronous communication between the MCU and a terminal, computer or a