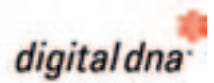## A FLASH MCU SOLUTION

68HC908QT1
8-bit Microcontroller

TARGET APPLICATIONS

- Discrete replacement
- Appliances
- Control systems
- Home and industrial security systems
- Fluorescent light ballasts
- Electromechanical replacement

The 68HC908QT1 helps reduce system cost by eliminating the need for external low-voltage inhibit, external drivers with high-current I/O and external data EEPROM and helps reduce programming cost with Fast FLASH programming. Other valuable features include an internal clock oscillator. It helps maximize efficiency and speed time-to-market with the ability change code in-application with FLASH and free, professional-quality development tools including a QT/QY C compiler, simulator, assembler, linker, FLASH programmer and auto-code generator.

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 operation 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

- Easy-to-learn, easy-to-use architecture
- Object compatible with 68HC05
- Allows for efficient, compact modular coding in assembly or C

1.5K BYTES INTEGRATED SECOND-GENERATION FLASH MEMORY

- In-application reprogrammable

- Cost-effective programming changes and field software upgrades via in-application programmability and reprogrammability
- Virtually eliminates scrap, costly rework and cost of socket
- The benefits of FLASH at competitive OTP prices

- Extremely fast programming
  – As fast as 32 μsec/byte
  – Up to 100x faster than most embedded FLASH

- Helps to reduce production programming costs through ultra-fast programming
- Helps to reduce power and speed application when writing non-volatile data is required

- FLASH easily used for data EEPROM
  – 10K minimum write/erase cycles across temperature
  – Byte writeable
  – No restrictions or special instructions to access data in FLASH program memory

- Virtually eliminates the need and cost for external serial data EEPROM
- Easily performs table lookup and data manipulation without slow and cumbersome special table instructions

- Flexible block protection and security

- Helps to protect code from unauthorized reading
- Guards against unintentional erasing/writing of user-programmable segments of code

INTERNAL CLOCK OSCILLATOR

- 3.2 MHz nominal bus frequency
- +/- 25 percent trimmable
- +/- 5 percent accurate to 105°C

- Can eliminate the cost of all external clock components
- Helps to reduce board space
- Can eliminate EMI generated from external clocks
- Allows option of external RC, external clock or external crystal/resonator

FLEXIBLE I/O

- Up to five bidirectional I/O and one input
- High-current drive
- Programmable pull-ups/keyboard interrupt

- High-current I/O allows direct drive of LED and other circuits to virtually eliminate external drivers and reduce system costs
- Keyboard scan with programmable pull-ups virtually eliminates external glue logic when interfacing to simple keypads

PART NUMBER	DESCRIPTION	RESALE*
EASY-TO-ORDER DEVELOPMENT TOOL KITS		
KITMMEVS08QTQY (KITMMEVS08QTQY-E for Europe)	Cost-effective real-time, in-circuit emulator and debug kit. Includes MON08 Multilink.	$1450
KITMMDS08QTQY (KITMMDS08QTQY-E for Europe)	High-performance real-time, in-circuit emulation and debug. Includes MON08 Multilink.	$3950
INDIVIDUAL DEVELOPMENT TOOL COMPONENTS		
CodeWarrior™ Development Studio Special Edition for HC08	CodeWarrior IDE, QT/QY C compiler, assembler, linker, debugger, full-chip simulation, FLASH programming and automatic C code generation for on-chip peripherals with Processor Expert™.	Free
M68DEMO908QT4 Demonstration Board	Evaluation board with tutorial, demonstration code and CodeWarrior	$25
M68MULTILINK08 (M68MULTILINK08-EUR for Europe)	Fast in-circuit programming and debug. Utilizes HC08 monitor mode and on-chip breakpoint.	$168
M68CYCLONE08 (M68CYCLONE08-EUR for Europe)	All capabilities of MON08 Multilink, plus functions as standalone programmer.	$399
M68EML08QTQY	Emulation module daughter board	$495
M68CBL05A	Low-noise flex cable	$120
M68TA08QTP8	8-pin DIP and SOIC target head adapter	$100
M68DIP8SOIC	8-pin DIP to SOIC adapter	$50

FEATURES   BENEFITS

TWO PROGRAMMABLE 16-BIT TIMER CHANNELS

- 125 nsec resolution at 8 MHz
- Free-running counter or modulo up-counter

- Each channel independently programmable for input capture, output compare or unbuffered PWM
- Pairing timer channels provides a buffered PWM function

SYSTEM PROTECTION

- COP watchdog timer with auto-wakeup from STOP capability
- Low-voltage inhibit with selectable trip points

- Provides system protection in the event of runaway code by resetting the MCU to a known state
- Helps to reduce power usage while automatically providing wakeup to check external sensors or perform periodic servicing
- Designed to improve reliability by resetting the MCU when voltage drops below trip point

APPLICATION NOTES/DATA SHEET

APPLICATION NOTES
- AN2317/D - Low-Cost Programming and Debugging Options for M68HC08 MCUs
- AN2305/D - User Mode Monitor Access for MC68HC908QT/QY Series MCUs
- AN2310/D - MC68HC908QT4 Low-Power Application
- AN2312/D - QY4 Internal Oscillator Usage Notes
- AN2322/D - Reprogramming the M68DEMO908QT4

DATA SHEET
MC68HC908QY4/D   Data Sheet for QY4/QY2/QY1/QT4/QT2/QT1
MC68HC908QY4SM/D   Data Sheet Summary for QY4/QY2/QY1/QT4/QT2/QT1

PACKAGE OPTIONS**

PART NUMBER	PACKAGE	TEMPERATURE RANGE
MC68HC908QT4CP	8 DIP	-40 to 85°C
MC68HC908QT4CDW	8 SOIC	-40 to 85°C
SAMPLE PACKS	**PACKAGE**	**TEMPERATURE RANGE**
KMC908QT4CP	8 DIP	-40 to 85°C
KMC908QT4CDW	8 SOIC	-40 to 85°C

8-Lead DIP   8-Lead SOIC

MOTOROLA

68HC908QT1PB/D
REV 0

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

** Contact your sales representative for extended temperature availability.