

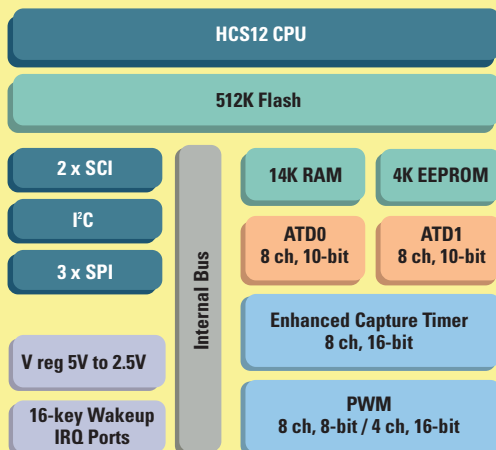
A FLASH MCU SOLUTION

MC9S12A512
16-bit Microcontroller

TARGET APPLICATIONS

- Instrumentation
- Energy Management
- Industrial Control
- Robotics
- Safety Equipment
- Security

The MC9S12A512 Flash microcontroller is the next generation of the highly successful 68HC12 architecture. Utilizing Motorola's industry-leading 0.25µ Flash, the A512 is part of a pin-compatible family that is planned to scale from 32 Kbytes to 512 Kbytes of Flash memory. The MC9S12A512 provides an upward migration path from Motorola's 68HC08, 68HC11 and 68HC12 architectures for applications that need larger memory, more peripherals and higher performance.



FEATURES

BENEFITS

HIGH-PERFORMANCE 16-BIT HCS12 CPU CORE

- 25 MHz bus operation at 5V for 40 nsec minimum instruction cycle time
- Opcode compatible with the 68HC11 and 68HC12
- C optimized architecture produces extremely compact code

ON-CHIP DEBUG INTERFACE

- Dedicated serial debug interface
- On-chip breakpoints
- Real-time in-circuit emulation and debug without expensive and cumbersome "box" emulators
- Read/write memory and registers while running at full speed

INTEGRATED THIRD-GENERATION FLASH MEMORY

- In-application re-programmable
- Self-timed, fast programming
 - Fast Flash page erase – 20 msec (512 bytes)
 - Can program 16 bits in 20 µsec while in burst mode
- 5V Flash program/erase/read
- Flash granularity – 512 byte Flash erase / 2 byte Flash program
- Four independently programmable Flash arrays
- Flexible block protection and security
- Flexibility to change code in the field
- Efficient end-of-line programming
- Total program time for 512 Kbyte code is less than 10 sec
- Reduces production programming cost through ultra-fast programming
- No external high voltage or charge pump required
- Virtual EEPROM implementation, Flash array usable for EE extension
- Can erase one array while executing code from another

4 KBYTES INTEGRATED EEPROM

- Flexible protection scheme for protection against accidental program or erase
- EEPROM can be programmed in 46 µsec
- Can erase 4 bytes at a time and program 2 bytes at a time for calibration, security, personality and diagnostic information

10-BIT ANALOG-TO-DIGITAL CONVERTER

- Two, 8-channel A/D converters
- 7 µsec, 10-bit single conversion time, scan mode available
- Fast, easy conversion from analog inputs like position sensors, analog meters and photovoltaic cells to digital values for CPU processing
- A/Ds run in parallel for a 7 µsec conversion for two 10-bits or, in other words, 3.5 µsec for 10-bits

CLOCK GENERATION MODULE WITH PLL

- Clock monitor with limp home mode in case of no external clock
- Programmable clock frequency with 1024 options ranging from divide by 16 to multiply by 64 from base oscillator
- Slow mode divider
- Real-time interrupt
- Watchdog
- Reliable, robust operation
- Provides high performance using low-cost reference crystals
- Reduces generated noise
- Reduces power consumption
- Easily able to implement real-time clock

For More Information On This Product, Go to: www.freescale.com

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MC9S12A512

DATA SHEETS

9S12DP512-ZIP	MC9S12DP512 Users Guide, Zip format
9S12DP512DGV1/D	9S12DX512 Device Guide
READ-ME_HCS12	READ-ME_HCS12—HCS12 Document Methodology

REFERENCE MANUAL

CPU12RM	HCS12 and M68HC12 CPU12 Reference Manual
S12ATD10B8CV2/D	HCS12 10-bit, 8-Channel Analog to Digital Converter (ADC) Block Guide
S12BDLCV1/D	HCS12 Byte Data Link Controller (BDLC) Block Guide
S12CRGV4/D	HCS12 Clocks and Reset Generator (CRG) Block
S12DP256PIMV3/D	9S12DP256 Port Integration Module (PIM)
S12ECT16B8CV1/D	HCS12 16-bit, 8-Channel Enhanced Capture Timer (ECT) Block Guide
S12EETS4KV2/D	HCS12 4K EEPROM Block Guide
S12FTS512K4V1/D	HCS12 512K Flash Block Guide
S12IICV2/D	HCS12 Inter-Integrated Circuit (IIC) Block Guide
S12PWM8B8CV1/D	HCS12 8-bit, 8-Channel Pulse Width Modulator (PWM) Block Guide
S12SCIV2/D	HCS12 Serial Communications Interface (SCI) Block Guide
S12SPIV3/D	HCS12 Serial Peripheral Interface (SPI) Block Guide
S12VREGV1/D	HCS12 Voltage Regulator Block Guide

DEVELOPMENT TOOLS

M68KIT912DP256	HCS12 Development Kit; Includes M68MULTILINK 12 and a MC9S12DP256 evaluation board
M68MULTILINK12	Universal HC12 / HCS12 in-circuit emulator, debugger, and Flash programmer through BDM interface
USBMULTILINK12	USB version of the M68MULTILINK12
SCBDMPGMRS12	16-bit BDM Stand Alone Programmer
M68CYCLONE PRO	HC08/HCS08/HC12/HCS12 stand-alone Flash programmer or in-circuit emulator, debugger, Flash programmer; USB, serial or Ethernet PC connection options

FEATURES

BENEFITS

ENHANCED CAPTURE TIMER

- 8-channel 16-bit with input capture, output compare and pulse accumulator
- 16-bit modulus down counter

- Flexible, programmable timer system

8-BIT OR 16-BIT PULSE WIDTH MODULATION

- 8-channel 8-bit or 4-channel 16-bit PWM
- PWM supports "center-aligned operation"

- Efficiently implement motor control, battery charging or digital to analog functions

TWO SERIAL COMMUNICATIONS INTERFACES

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

THREE SERIAL PERIPHERAL INTERFACES

- High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals

INTER IC BUS (I²C)

- Provides a simple, efficient method of data exchange between devices
- Minimizes the need for large numbers of connections between devices and eliminates the need for an address decoder

UP TO 91 INPUT/OUTPUT (I/O) LINES

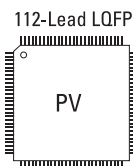
- Programmable pull-ups / pull-downs
- Dual drive capability
- Reduce system cost
- Able to tailor application for minimum EMC or high current loads

APPLICATION NOTES AND ENGINEERING BULLETINS

AN2206/D	Security and Protection on the HCS12 Family	AN2216/D	MC9S12DP256 Software Development Using Metrowerks CodeWarrior™
AN2213/D	Using Cosmic Software's M68HC12 Compiler for MC9S12DP256 Software Development	AN2250/D	Audio Reproduction on HCS12 Microcontrollers
		EB386/D	HCS12 D-Family Compatibility

PACKAGE OPTIONS

PART NUMBER	PACKAGE	TEMPERATURE RANGE
MC9S12A512CPV	112 LQFP	-40 to 85°C



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Go to: www.freescale.com

MC9S12A512CPV
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