Microcontrollers

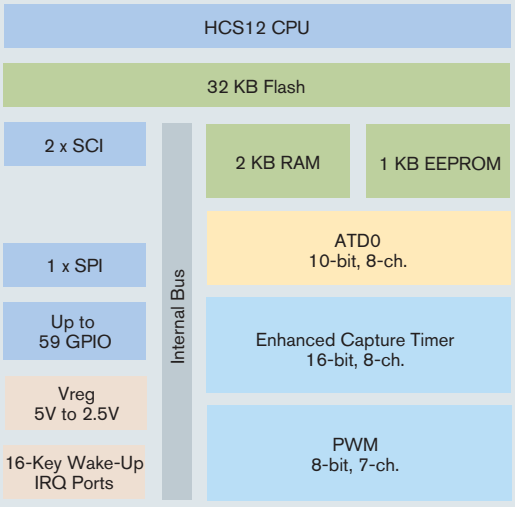
MC9S12A32

Target Applications

> Instrumentation
> Energy management
> Industrial control
> Robotics
> Safety equipment
> Security

Overview

Freescale Semiconductor's MC9S12A32 Flash microcontroller (MCU) is the next generation of the highly successful 68HC12 architecture. Using Freescale's industry-leading 0.25 µs Flash, the A32 is part of a pin-compatible family that is planned to scale from 32 KB to 512 KB of Flash memory. The MC9S12A32 provides an upward migration path from Freescale's 68HC08, 68HC11 and 68HC12 architectures for applications that need peripherals and higher performance.



Features	Benefits
High-Performance 16-bit HCS12 CPU Core	
> 25 MHz bus operation at 5V for 40 ns 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 reprogrammable > Self-timed, fast programming ▪ Fast Flash page erase—20 ms (512 bytes) ▪ Can program 16 bits in 20 µs while in burst mode > 5V Flash program/erase/read > Flash granularity—512 byte Flash erase/2 byte Flash program > Two 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 32 KB code is less than five seconds > 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
1 KB Integrated EEPROM	
> Flexible protection scheme for protection against accidental program or erase > EEPROM can be programmed in 46 µs	> 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 (ADC)	
> One, 8-channel ADC > 7 µs, 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

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Features	Benefits
Clock Generation Module with Phase-Lock Loop (PLL)	
> Clock monitor with limp home mode in case of no external clock	> Reliable, robust operation
> Programmable clock frequency with 1024 options ranging from divide by 16 to multiply by 64 form base oscillator	> Provides high performance using low-cost reference crystals
> Real-time interrupt	> Reduces generated noise
> Watchdog	> Reduces power consumption
	> Easily able to implement real-time clock
Enhanced Capture Timer	
> 8-channel, 16-bit with input capture, output compare and pulse accumulator	> Flexible, programmable timer system
> 16-bit modulus down counter	
8-bit or 16-bit Pulse-Wide Modulation (PWM)	
> 7-channel, 8-bit	> Efficiently implement motor control, battery charging or digital-to-analog (DAC) functions
> PWM supports center-aligned operation	
One Serial Communications Interface	
> 8192 prescaler option	> Asynchronous communication between the MCU and a terminal, computer or a network of MCUs
Two Serial Peripheral Interfaces	
> 256 clock rate options	> High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals
Up to 59 Input/Output (I/O) Lines	
> Programmable pull-ups/pull-downs	> Reduce system cost
> Dual drive capability	> Able to tailor application for minimum EMC or high current loads

Application Notes and Engineering Bulletins

AN2206	Security and Protection on the HCS12 Family
AN2216	MC9S12DP256 Software Development Using Metrowerks CodeWarrior™
AN2250	Audio Reproduction on HCS12 Microcontrollers
AN2597	Using the MC9S12E128 to Implement an IrDA Interface
AN2720	Programming Single Flash Array HCS12 MCUs
EB386	HCS12 D-Family Compatibility

Data Sheets

9S12DJ64DGV1	MC9S12DJ64 Device Guide
S12DT128PIMV1	MC9S12A128 Port Integration Module Block Guide
S12ATD10B8CV2	HCS12 10-bit 8-channel Analog to Digital Block Guide
S12BDMV4	HCS12 Background Debug (BDM) Block Guide
S12BKVD1	HCS12 Breakpoint (BKP) Block Guide
S12CPUV2	HCS12 CPU Reference Manual
S12CRGV3	HCS12 Clock Reset Generator Block Guide
S12FTS32KV1	HCS12 128K Flash Block Guide
S12INTV1	HCS12 Interrupt (INT) Block Guide
S12MEBIV3	HCS12 Multiplexed External Bus Interface (MEBI) Block Guide
S12MMCV4	HCS12 Module Mapping Control (MMC) Block Guide
S12PWM8B8CV1	HCS12 8-bit 8-channel Pulse-Width Modulator Block Guide
S12SCIV2	HCS12 Serial Communications Interface Block Guide
S12SPIV2	HCS12 Serial Peripheral Interface Block Guide
S12TIM16B8CV1	HCS12 16-bit 8-channel Timer Block Guide
S12VREGV1	HCS12 Voltage Regulator Block Guide

Cost-Effective Development Tools

For more information on development tools, please refer to the Freescale Development Tool Selector Guide (SG1011).

M68KIT912DP256 ***$495***	Evaluation kit for development and evaluation of HCS12 application code that includes the M68EVB912DP256 and USBMULTILINKBDM
M68CYCLONEPRO ***$499***	HC08/HCS08/HC12/HCS12 stand-alone Flash programmer or in-circuit emulator, debugger, Flash programmer; USB, serial or Ethernet interface options
USBMULTILINKBDM ***$99***	Universal HCS08/HCS12 in-circuit emulator, debugger, and Flash programmer; USB PC interface
CWX-H12-SE ***Free***	CodeWarrior™ Special Edition for HCS12 MCUs; includes integrated development environment (IDE), linker, debugger, unlimited assembler, Processor Expert™ auto-code generator, full-chip simulation and limited C compiler

Package Options

Part Number	Package	Temp. Range
MC9S12A32CFU	80 QFP	-40°C to +85°C

80-Lead LQFP

Learn More: For more information about Freescale products, please visit **www.freescale.com**.

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