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.

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

Features

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<tr>
<th>Features</th>
<th>Benefits</th>
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<tr>
<td>High-Performance 16-bit HCS12 CPU Core</td>
<td>Opcode compatible with the 68HC11 and 68HC12</td>
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<td>On-Chip Debug Interface</td>
<td>Real-time in-circuit emulation and debug without expensive and cumbersome box emulators</td>
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<td>Integrated Third-Generation Flash Memory</td>
<td>Read/write memory and registers while running at full speed</td>
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<td>1 KB Integrated EEPROM</td>
<td>Flexibility to change code in the field</td>
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<td>10-bit Analog-to-Digital Converter (ADC)</td>
<td>Efficient end-of-line programming</td>
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Features

- HCS12 CPU
- 32 KB Flash
- 2 x SCI
- 1 x SPI
- Up to 59 GPIO
- Vreg 5V to 2.5V
- 16-Key Wake-Up
- IRQ Ports
- 2 KB RAM
- 1 KB EEPROM
- ATD0 10-bit, 8-ch.
- Enhanced Capture Timer 16-bit, 8-ch.
- PWM 8-bit, 7-ch.
### Features

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| **Clock Generation Module with Phase-Lock Loop (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 form base oscillator  
> 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 |
| **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-Wide Modulation (PWM)** | > 7-channel, 8-bit  
> PWM supports center-aligned operation | > Efficiently implement motor control, battery charging or digital-to-analog (DAC) functions |
| **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  
> Dual drive capability | > Reduce system cost  
> 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

- 9S12DJ64DGVI: 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
- 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
- S12MMC4: 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
- S12SPV2: 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

- M68KIT912DP256: Cost-Effective Development Tools  
  Evaluation kit for development and evaluation of HCS12 application code that includes the M68EVB912DP256 and USBMULTILINKBDM  
  $495
- M68CYCLONEPRO: 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  
  $499
- USBMULTILINKBDM: Universal HCS08/HCS12 in-circuit emulator, debugger, and Flash programmer; USB PC interface  
  $99
- CWX-H12-SE: 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  
  Free

### Package Options

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

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**Learn More:** For more information about Freescale products, please visit [www.freescale.com](http://www.freescale.com).