### Overview

Freescale Semiconductor’s MC9S12A256 Flash microcontroller (MCU) is the next generation of the highly successful 68HC12 architecture. Using Freescale’s industry-leading 0.25 µs Flash, the A256 is part of a pin-compatible family that scales from 32 KB to 512 KB of Flash memory. The MC9S12A256 provides an upward migration path from Freescale’s 68HC08, 68HC11 and 68HC12 architectures for applications that need larger memory, more peripherals and higher performance.

### Target Applications

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

### Features

<table>
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<th>Features</th>
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| **High-Performance 16-bit HCS12 CPU Core** | Opcode compatible with the 68HC11 and 68HC12  
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| > 25 MHz bus operation at 5V for 40 ns minimum instruction cycle time |  
 C-optimized architecture produces extremely compact code |
| **On-Chip Debug Interface** |  
 Real-time in-circuit emulation and debug without expensive and cumbersome box emulators |
| > Dedicated serial debug interface  
 > On-chip breakpoints |  
 > Read/write memory and registers while running at full speed |
| **Integrated Third-Generation Flash Memory** |  
 Flexibility to change code in the field |
| > 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  
 > Four independently programmable Flash arrays  
 > Flexible block protection and security |  
 Efficient end-of-line programming  
 Total program time for 256 KB code is less than 10 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 |
| **4 KB Integrated EEPROM** |  
 Can erase 4 bytes at a time and program 2 bytes at a time for calibration, security, personality and diagnostic information |
| > 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)** |  
 Fast, easy conversion from analog inputs like position sensors, analog meters and photovoltaic cells to digital values for CPU processing |
| > Two, 8-channel ADCs  
 > 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 |
| Enhanced Capture Timer  
 16-bit, 8-ch. |  
 ADCs run in parallel for a 7 µs conversion for two 10-bits or, in other words, 3.5 µs for 10-bits |
| 16-Key Wake-Up  
 IRQ Ports |  
 Enhanced Capture Timer  
 16-bit, 8-ch.  
 8-bit, 8-ch./16-bit, 4-ch. |
| 2 x SCI  
 I²C  
 3 x SPI |  
 Enhanced Capture Timer  
 16-bit, 8-ch.  
 8-bit, 8-ch./16-bit, 4-ch. |

### Specifications

- **HCS12 CPU**
- **256 KB Flash**

- **12 KB RAM**  
 **4 KB EEPROM**

- **Vreg**  
 5V to 2.5V

- **PWM**  
 8-bit, 8-ch./16-bit, 4-ch.
Learn More: For more information about Freescale products, please visit www.freescale.com.