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What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	HCS12
Core Size	16-Bit
Speed	25MHz
Connectivity	CANbus, I²C, SCI, SPI
Peripherals	PWM, WDT
Number of I/O	59
Program Memory Size	64KB (64K x 8)
Program Memory Type	FLASH
EEPROM Size	1K x 8
RAM Size	4K x 8
Voltage - Supply (Vcc/Vdd)	2.35V ~ 5.25V
Data Converters	A/D 8x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	80-QFP
Supplier Device Package	80-QFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/nxp-semiconductors/mc9s12dj64vfuer

Microcontrollers

MC9S12DJ64

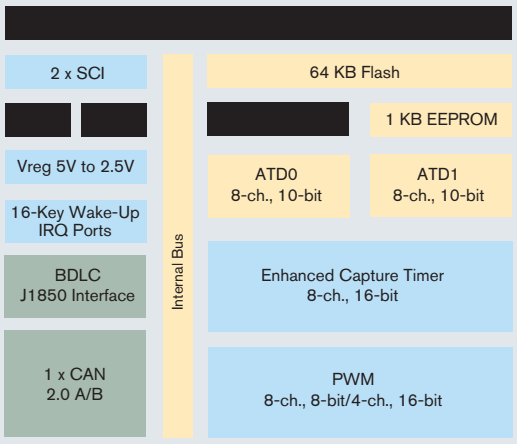
Target Applications

> Automotive applications

> Industrial control

Overview

Freescale Semiconductor's HCS12 family of microcontrollers (MCUs) is the next generation of the highly successful 68HC12 architecture. Using Freescale's industry-leading 0.25 µs Flash, the MC9S12DJ64 is part of a pin-compatible family that scales from 32 KB to 512 KB of Flash memory. The DJ64 provides an upward migration path from Freescale's 68HC08, 68HC11 and 68HC12 architectures for applications that need larger memory, more peripherals and higher performance. Also, with the increasing number of CAN/J1850-based electronic control units (ECUs), its multiple network modules support this environment by enabling highly efficient communications between different network buses.



Features	Benefits
High-Performance 16-bit HCS12 CPU Core	
> 25 MHz bus operation at 5V for 40 ns minimum instruction cycle time	> Object code compatible 68HC12 > Assembly source code compatible with the 68HC11 > 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
Network Modules	
> One msCAN module implementing the CAN 2.0 A/B protocol ▪ Five receive buffers per module with FIFO storage scheme ▪ Three transmit buffers per module with internal prioritization > One J1850 module	> Programmable bit rate up to 1 Mbps > FIFO receive approach superior for event-driven networks > Ability to send and receive messages across an SAE J1850 serial communication network
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 > Flexible block protection and security	> Flexibility to change code in the field > Efficient end-of-line programming > Total program time for 128 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
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)	
> Two, 8-channel ADCs > 7 µs, 10-bit single conversion time, scan mode available	> Fast, easy conversion from analog inputs like temperature, pressure and fluid levels to digital values for CPU processing > Can effectively have 3.5 µs conversion time by sampling same signal with both ADCs

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Features	Benefits
Clock Generation Module with Phase-Lock Loop (PLL)	
> Clock monitor with self clock 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 from base oscillator	> Provides high performance using low-cost reference crystals > Reduces generated noise
> Real-time interrupt	> Reduces power consumption
> Watchdog	> 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-Width Modulation (PWM)	
> 8-channel, 8-bit or 4-channel, 16-bit PWM	> Efficiently implement motor control, battery charging or digital-to-analog (DAC) functions
> PWM supports center-aligned operation	
Two Serial Communications Interfaces	
> 8192 prescaler options	> Asynchronous communication between the MCU and a terminal, computer or a network of MCUs > Exact baud rate matching
One Serial Peripheral Interface	
> Up to 12.5 Mbps	> High-speed synchronous communication between multiple MCUs or between MCU and serial peripherals
Inter-IC (I^2C) Bus	
> 256 clock-rate options	> 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	> Reduce system cost
> Dual drive capability	> Able to tailor application for minimum EMC or high current loads

Application Notes and Engineering Bulletins

AN1284	Transporting M68HC11 Code to M68HC12 Devices
AN1716	Using M68HC12 Indexed Indirect Addressing
AN1775	Expanding Digital Input with an A/D Converter
AN1783	Determining MCU Oscillator Start-Up Parameters
AN2104	Using Background Debug Mode for the M68HC12 Family
AN2204	Fast NVM Programming for the MC9S12DP256
AN2216	MC9S12DP256 Software Development Using Metrowerks CodeWarrior™
AN2318	Using the I^2C Bus with HCS12 Microcontrollers
BCANPSV2.0	Bosch Controller Area Network (CAN) Version 2.0 Protocol Standard
BDLCRM	Byte Data Link Controller Reference Manual
EB396	Use of OSC2/XTAL as a Clock Output on Motorola Microcontrollers

Data Sheets

9S12DJ64DGV1	MC9S12A64 Device Guide
S12A64PIMV1	MC9S12A64 Port Integration Module Block Guide
S12BDMV4	HCS12 Background Debug (BDM) Block Guide
S12BKVD1	HCS12 Breakpoint (BKP) Block Guide
S12CPUV2	HCS12 CPU Reference Manual
S12MSCANV2	HCS12 Motorola Scalable Controller Area Network Block Guide
S12ATD10B8CV2	HCS12 10-bit 8-channel Analog to Digital Block Guide
S12CRGV3	HCS12 Clock Reset Generator Block Guide
S12ECT16B8CV1	HCS12 16-bit 8-channel Enhanced Capture Timer Block Guide
S12EETS2KV1	HCS12 2K EEPROM Block Guide
S12FTS128KV1	HCS12 128K Flash Block Guide
S12IICV2	HCS12 I^2C 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
S12VREGV1	HCS12 Voltage Regulator Block Guide
S12BDLCV1	HCS12 Byte Data Link Controller Block Guide

Cost-Effective Development Tools

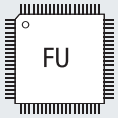
For more information on development tools, please refer to the Freescale Development Tool Selector Guide (SG1011).

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

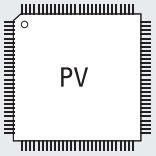
Package Options

Part Number	Package	Temp. Range
MC9S12DJ64CFU	80 QFP	-40°C to +85°C
MC9S12DJ64VFU	80 QFP	-40°C to +105°C
MC9S12DJ64MFU	80 QFP	-40°C to +125°C
MC9S12DJ64CPV	112 LQFP	-40°C to +85°C
MC9S12DJ64VPV	112 LQFP	-40°C to +105°C
MC9S12DJ64MPV	112 LQFP	-40°C to +125°C

80-Lead QFP



112-Lead LQFP



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

*Price indicated is MSRP.

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