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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

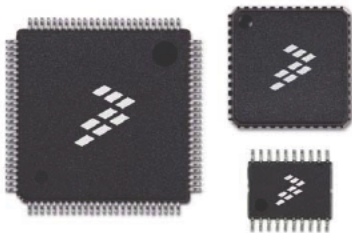
|                            |   |
|----------------------------|---|
| Product Status             | Active  |
| Core Processor             | 12V1  |
| Core Size                  | 16-Bit  |
| Speed                      | 25MHz   |
| Connectivity               | IrDA, LINbus, SCI, SPI  |
| Peripherals                | LVD, POR, PWM, WDT  |
| Number of I/O              | 14  |
| Program Memory Size        | 32KB (32K x 8)  |
| Program Memory Type        | FLASH   |
| EEPROM Size                | 1K x 8  |
| RAM Size                   | 2K x 8  |
| Voltage - Supply (Vcc/Vdd) | 3.13V ~ 5.5V  |
| Data Converters            | A/D 8x10b   |
| Oscillator Type            | Internal  |
| Operating Temperature      | -40°C ~ 125°C (TA)  |
| Mounting Type              | Surface Mount   |
| Package / Case             | 20-TSSOP (0.173", 4.40mm Width)   |
| Supplier Device Package    | 20-TSSOP  |
| Purchase URL               | <a href="https://www.e-xfl.com/product-detail/nxp-semiconductors/s9s12gn32bmtj">https://www.e-xfl.com/product-detail/nxp-semiconductors/s9s12gn32bmtj</a> |



16-bit Microcontrollers

## S12G Family

Feature-rich 16-bit microcontrollers for body applications



### Applications

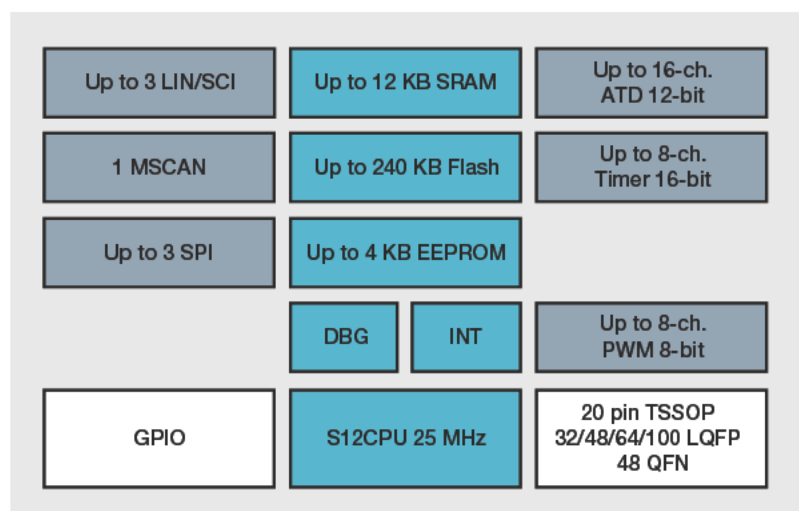
- Space-constrained applications
- Body controllers
- Door modules
- HVAC
- Seat controllers
- Smart actuators
- RKE receivers
- Occupant detection
- Lighting modules
- Smart junction boxes
- Fuel pumps
- Oil pumps

### Overview

The Freescale Semiconductor MC9S12G family is a feature-rich 16-bit microcontroller product line focused on low cost, high performance and low pin count for automotive applications. This family bridges the gap between high-end 8-bit microcontrollers and high-performance 16-bit microcontrollers, such as the MC9S12XS family. The MC9S12G family is targeted at generic automotive applications requiring CAN or LIN/SAE J2602 communication and is used in applications such as body controllers, door modules, occupant detection and lighting modules.

The MC9S12G family uses many of the same features found on the MC9S12XS and MC9S12P family, including error correction code (ECC) on flash memory, a fast analog-to-digital converter (ADC) and a frequency modulated phase locked loop (IPLL) that improves the EMC performance. In order to make using the MC9S12G family easier in your embedded designs, it features an EEPROM with a small erase sector size.

### S12G Family Block Diagram



The MC9S12G family delivers the advantages and efficiencies of a 16-bit MCU while retaining the cost-effective, power consumption, EMC and code-size efficiency advantages of our existing 8-bit and 16-bit MCU families. Like the MC9S12XS family, the MC9S12G family runs 16-bit wide accesses without wait states for peripherals and memory. The MC9S12G family is available in 20 TSSOP, 48 QFN, 32, 48, 64 and 100 LQFP packages for embedded design flexibility. It aims to maximize the amount of functionality, especially in the lower pin-count packages. In addition to the I/O ports available in each module, further I/O ports are available with interrupt capability allowing wake-up from stop or wait modes.

## Enablement Tools

The S12G family application development is enhanced with CodeWarrior Development Tool Suite and a variety of third-party development software. In addition, we now offer four S12G Tower development board kits

- TWR-S12G240/TWR-S12G240-KIT
- TWR-S12G128/TWR-S12G128-KIT
- TWR-S12G64/TWR-S12G64-KIT
- TWR-S12GN32/TWR-S12GN32-KIT

## MC9S12G Family Features and Benefits

| Features   | Benefits  |
|--|---|
| S12 CPU core, 25 MHz bus and up to 240 KB on-chip flash with ECC   | Industry-proven S12 architecture and more horsepower for more complex 8-bit design applications                       |
| Up to 240 KB on-chip flash with ECC  | Offers on-chip flash to store code and help save on-board flash/ROM   |
| Up to 4 KB EEPROM with ECC   | Easier user interface than data flash   |
| Up to one multi-scalable controller area network (MSCAN) module (supporting CAN protocol 2.0A/B)   | Designed to support complex system needs CAN communication port   |
| Up to three serial communication Interface (SCI) modules supporting LIN communications and up to three serial peripheral Interface (SPI) modules         | Helps provide more flexibility, options and advantages when your system needs more SCI/LIN or SPI communication ports |
| Up to 12 KB on-chip SRAM   | N/A   |
| Phase locked loop (PLL) frequency multiplier with internal filter  | N/A   |
| Timer module (TIM) supporting up to eight channels that provide a range of 16-bit input capture, output compare, counter and pulse accumulator functions | N/A   |
| Pulse width modulation (PWM) module with up to eight 8-bit channels  | N/A   |
| Up to 16-channel, 12-bit resolution successive approximation analog-to-digital converter (ADC)   | N/A   |
| Precision fixed voltage reference for ADC conversions  | N/A   |
| On-chip voltage regulator (VREG) for regulation of input supply and all internal voltages  | N/A   |
| Analog comparator module<br>8-bit digital-to-analog converter (DAC)  | N/A   |

## Package Options

| Device   | Flash  | RAM   | EEPROM | MSCAN | SCI | SPI | ADC            | Analog Comparator | DAC | PWM          | Timer         | Package Options                                    |
|----------|--------|-------|--------|-------|-----|-----|----------------|-------------------|-----|--------------|---------------|--|
| S12GN16  | 16 KB  | 1 KB  | 512B   | –     | 1   | 1   | 8-ch., 10-bit  | 1                 | –   | 6-ch., 8-bit | 6-ch., 16-bit | 20-pin TSSOP, 32-pin LQFP, 48-pin LQFP, 48-pin QFN |
| S12GN32  | 32 KB  | 2 KB  | 1 KB   | –     | 1   | 1   | 8-ch., 10-bit  | 1                 | –   | 6-ch., 8-bit | 6-ch., 16-bit | 20-pin TSSOP, 32-pin LQFP, 48-pin LQFP, 48-pin QFN |
| S12GN48  | 48 KB  | 4 KB  | 1.5 KB | –     | 2   | 2   | 12-ch., 10-bit | 1                 | –   | 6-ch., 8-bit | 6-ch., 16-bit | 32-pin LQFP, 48-pin LQFP, 64-pin LQFP              |
| S12G48   | 48 KB  | 4 KB  | 1.5 KB | 1     | 2   | 2   | 12-ch., 10-bit | 1                 | –   | 6-ch., 8-bit | 6-ch., 16-bit | 32-pin LQFP, 48-pin LQFP, 64-pin LQFP              |
| S12G64   | 64 KB  | 4 KB  | 2 KB   | 1     | 2   | 2   | 12-ch., 10-bit | 1                 | –   | 6-ch., 8-bit | 6-ch., 16-bit | 32-pin LQFP, 48-pin LQFP, 64-pin LQFP              |
| S12G96   | 96 KB  | 8 KB  | 3 KB   | 1     | 3   | 3   | 12-ch., 10-bit | –                 | –   | 8-ch., 8-bit | 8-ch., 16-bit | 48-pin LQFP, 64-pin LQFP, 100-pin LQFP             |
| S12G128  | 128 KB | 8 KB  | 4 KB   | 1     | 3   | 3   | 12-ch., 10-bit | –                 | –   | 8-ch., 8-bit | 8-ch., 16-bit | 48-pin LQFP, 64-pin LQFP, 100-pin LQFP             |
| S12G192  | 192 KB | 12 KB | 4 KB   | 1     | 3   | 3   | 12-ch., 10-bit | –                 | –   | 8-ch., 8-bit | 8-ch., 16-bit | 48-pin LQFP, 64-pin LQFP, 100-pin LQFP             |
| S12GA192 | 192 KB | 12 KB | 4 KB   | 1     | 3   | 3   | 16-ch., 12-bit | –                 | 2   | 8-ch., 8-bit | 8-ch., 16-bit | 48-pin LQFP, 64-pin LQFP, 100-pin LQFP             |
| S12G240  | 240 KB | 12 KB | 4 KB   | 1     | 3   | 3   | 16-ch., 10-bit | –                 | –   | 8-ch., 8-bit | 8-ch., 16-bit | 48-pin LQFP, 64-pin LQFP, 100-pin LQFP             |
| S12GA240 | 240 KB | 12 KB | 4 KB   | 1     | 3   | 3   | 16-ch., 12-bit | –                 | 2   | 8-ch., 8-bit | 8-ch., 16-bit | 48-pin LQFP, 64-pin LQFP, 100-pin LQFP             |

For more information, visit [freescale.com/S12G](http://freescale.com/S12G)