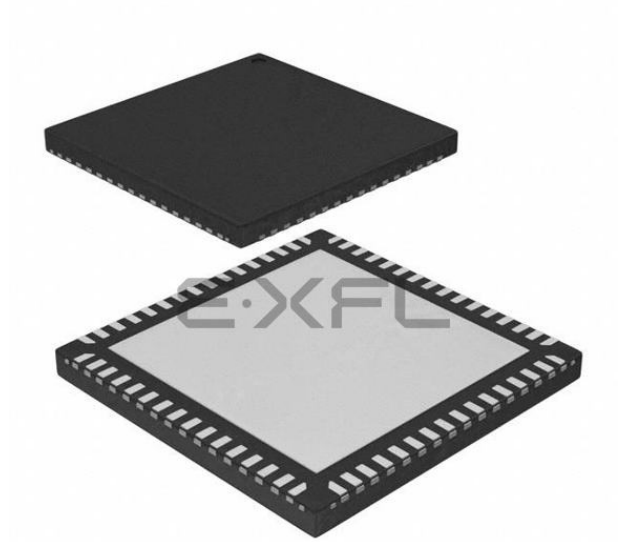


**Welcome to E-XFL.COM**

## What is "Embedded - Microcontrollers"?

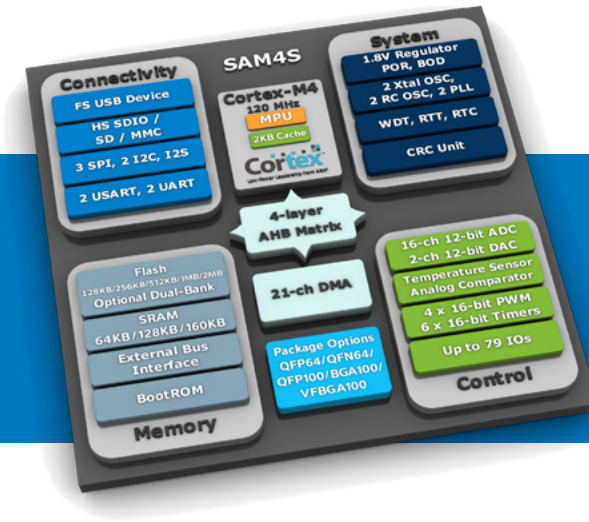
"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" 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 | ARM® Cortex®-M4 |
| Core Size | 32-Bit Single-Core |
| Speed | 120MHz |
| Connectivity | I²C, IrDA, Memory Card, SPI, SSC, UART/USART, USB |
| Peripherals | Brown-out Detect/Reset, DMA, POR, PWM, WDT |
| Number of I/O | 47 |
| Program Memory Size | 256KB (256K x 8) |
| Program Memory Type | FLASH |
| EEPROM Size | - |
| RAM Size | 64K x 8 |
| Voltage - Supply (Vcc/Vdd) | 1.62V ~ 3.6V |
| Data Converters | A/D 11x12b; D/A 2x12b |
| Oscillator Type | Internal |
| Operating Temperature | -40°C ~ 85°C (TA) |
| Mounting Type | Surface Mount |
| Package / Case | 64-VFQFN Exposed Pad |
| Supplier Device Package | 64-QFN (9x9) |
| Purchase URL | https://www.e-xfl.com/product-detail/microchip-technology/atsam4s4ba-mu |

# Atmel | SMART SAM4S Series MCU

## Scalable Performance, Memory Density, and Power Efficiency




Based on the powerful ARM® Cortex®-M4 processor, the Atmel® | SMART SAM4S series extends the Atmel® ARM Cortex-M-based microcontroller (MCU) portfolio to offer:

- Increased performance and power efficiency
- Higher memory densities up to 2MB of Flash and 160KB of SRAM
- Rich peripheral set for connectivity, system control and analog interfacing.

The SAM4S series offers pin-to-pin compatibility with Atmel | SMART SAM4N, SAM3S, SAM3N and SAM7S devices, facilitating easy migration within the portfolio.

### Key Features

- **Improved Performance Level** – Built around the ARM Cortex-M4 core, the Atmel SAM4S operates at 120MHz and integrates the Atmel Flash read accelerator and optional cache memory to increase system performance. The SAM4S features a multi-layer bus matrix, multi-channel direct memory access (DMA) and distributed memory to support high data rate communication.
- **Low Power Consumption** – The SAM4S series achieves 180µA/MHz in dynamic mode and 1µA at 1.8V in back-up mode with the real-time clock (RTC) running. Offering some of the best power consumption/performance rates on the market for standby mode, the SAM4S series reaches 120MHz operating frequency with a RAM retention mode below 25µA.
- **Safety and Security** – Integrated best-in-class hardware code protection:
  - Prevents access to on-chip memory to protect your intellectual property (IP)
  - Supports secure device reconditioning (chip erase) for reprogramming
  - A unique 128-bit ID and scrambled external bus interface ensure software confidentiality while the hardware CRC checks memory integrity
- **Atmel QTouch Capacitive Touch Support** – The SAM4S series is touch-ready, offering native support for Atmel's market-leading Atmel QTouch® technology so you can easily implement buttons, sliders and wheels in your application.
- **Ease of Use** – Accelerate your development cycle with Atmel Studio, a seamless, easy-to-use integrated development environment (IDE). Get a jump-start on your design with dedicated evaluation kits and software packages.
  For rapid evaluation and code development, Atmel and industry-leading third parties provide a full range of development tools, real-time operating system (RTOS), middleware and support services to reduce time to market.

### Application Areas

- Consumer goods and toys
- Industrial control
- Metering
- Medical
- Test and measurement
- 802.15.4 wireless networking
- PC, cell phone, gaming peripherals

## Design Tools and Ecosystem

Atmel offers a full suite of hardware tools for evaluation and prototyping with the SAM4S devices. All SAM4S evaluation tools are supported by Atmel Studio integrated development environment (IDE) and integrate QTouch library support for buttons, wheels and sliders. They are backed by a worldwide support ecosystem of industry-leading suppliers of development tools, real-time operating systems and middleware products to make your design process easier and reduce time to market.

**SAM4S Xplained Pro**

The Xplained Pro platform consist of a main board with multiple expansion ports plus extension boards, including OLED LCD displays, buttons, sensors and more. The board is available standalone or as part of a starter kit. The extension boards can also be purchased separately.

Evaluation Kit Ordering Code: ATSAM4S-XPRO
Starter Kit Ordering Code: ATSAM4S-XSTK

**SAM4S-EK2**

A full-featured board to quickly evaluate and develop code for applications running on Atmel | SMART SAM4S microcontrollers.

Ordering Code: ATSAM4S-EK2

**SAM4S Xplained**

The Xplained platform is for early evaluation of the capabilities offered by the SAM4S MCU which contains QTouch button sensors, LEDs, a USB port. The Xplained expansion headers provide easy access to analog and digital I/O pins. The board is powered by the USB cable and integrates a JTAG emulator with USB interface for programming and debugging.

Ordering Code: ATSAM4S-XPLD

**SAM4S Wireless PIR Reference Design Kit**

The SAM4S-WPIR-RD Reference Design Kit is based on the SAM4S16C device. Thanks to this reference design, you will be able to develop your own PIR motion detector camera.

Ordering Code: ATSAM4S-WPIR-RD

## SAM4S Ordering Information

| Atmel Ordering Code | Flash | SRAM | Cache | Package |
|---|---|---|---|---|
| ATSAM4SD32CA-CFU | 2x1MB Dual-bank | 160KB | 2KB | VFBGA100 |
| ATSAM4SD32CA-CU | | | | TFBGA100 |
| ATSAM4SD32CA-AU | | | | LQFP100 |
| ATSAM4SD32BA-AU | | | | LQFP64 |
| ATSAM4SD32BA-MU | | | | QFN64 |
| ATSAM4SD16CA-CFU | 2x512KB Dual-bank | 160KB | 2KB | VFBGA100 |
| ATSAM4SD16CA-CU | | | | TFBGA100 |
| ATSAM4SD16CA-AU | | | | LQFP100 |
| ATSAM4SD16BA-AU | | | | LQFP64 |
| ATSAM4SD16BA-MU | | | | QFN64 |
| ATSAM4SA16CA-CFU | 1MB | 160KB | 2KB | VFBGA100 |
| ATSAM4SA16CA-CU | | | | TFBGA100 |
| ATSAM4SA16CA-AU | | | | LQFP100 |
| ATSAM4SA16BA-AU | | | | LQFP64 |
| ATSAM4SA16BA-MU | | | | QFN64 |
| ATSAM4S16CA-CFU | 1MB | 128KB | -- | VFBGA100 |
| ATSAM4S16CA-CU | | | | TFBGA100 |
| ATSAM4S16CA-AU | | | | LQFP100 |
| ATSAM4S16BA-AU | | | | LQFP64 |
| ATSAM4S16BA-MU | | | | QFN64 |
| ATSAM4S16BA-UUR | | | | WLCSP64 |

| Atmel Ordering Code | Flash | SRAM | Cache | Package |
|---|---|---|---|---|
| ATSAM4S8CA-CFU | 512KB | 128KB | -- | VFBGA100 |
| ATSAM4S8CA-CU | | | | TFBGA100 |
| ATSAM4S8CA-AU | | | | LQFP100 |
| ATSAM4S8BA-AU | | | | LQFP64 |
| ATSAM4S8BA-MU | | | | QFN64 |
| ATSAM4S8BA-UUR | | | | WLCSP64 |
| ATSAM4S4CA-CFU | 256KB | 64KB | -- | VFBGA100 |
| ATSAM4S4CA-CU | | | | TFBGA100 |
| ATSAM4S4CA-AU | | | | LQFP100 |
| ATSAM4S4BA-AU | | | | LQFP64 |
| ATSAM4S4BA-MU | | | | QFN64 |
| ATSAM4S4BA-UUR | | | | WLCSP64 |
| ATSAM4S4AA-AU | | | | LQFP48 |
| ATSAM4S4AA-MU | | | | QFN48 |
| ATSAM4S2CA-CFU | 128KB | 64KB | -- | VFBGA100 |
| ATSAM4S2CA-CU | | | | TFBGA100 |
| ATSAM4S2CA-AU | | | | LQFP100 |
| ATSAM4S2BA-AU | | | | LQFP64 |
| ATSAM4S2BA-MU | | | | QFN64 |
| ATSAM4S2BA-UUR | | | | WLCSP64 |
| ATSAM4S2AA-AU | | | | LQFP48 |
| ATSAM4S2AA-MU | | | | QFN48 |

*The QFP package has a -40°C to 105°C option. Also available upon request for any other package type.*
*To order: replace the final letter 'U' by an 'N' (ex: ATSAM4S16CA-AN).*

Atmel | Enabling Unlimited Possibilities®

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